CONTENTS

FOR ENGINEERS AND CONTRACTORS CONTROLLING THE DESIGN, SPECIFICATION, INSTALLATION AND MAINTENANCE OF HEATING, VENTILATING AND AIR CONDITIONING.

HEATING & VENTILATING
AIR CONDITIONING

FOR JANUARY, 1940

Forecast and Introductory Section	17
Total Building Volume to be Steady in 1940	17
Indexes Indicate Steady Movement in Most Lines	22
Automatic Heating	24
Annual Sales of Summer Air Conditioning	25
Heating Business in New and Old Buildings	25
Value of Business	26
Winter Section	29
Large Rise in Sales in 1939 as Construction Mounts	31
Annual Sales (Charts)	33
Winter Equipment Sales Statistics (Tables)	34
Progress in 1939 Winter Equipment	43
Summer Section	67
Market Trends Toward Smaller Commercial Jobs	69
Summer Equipment Sales Statistics (Tables)	70
Progress in 1939 Summer Equipment	81
Year-Round Section	87
Air Hazards in Industry Highlighted in 1939	89
Annual Sales (Charts)	91
Year-Round Sales Statistics (Tables)	94
Progress in 1939 Year-Round Equipment	95
Controls and Instruments Section	111
Control Innovations, Test Kits Feature 1939	113
Progress in 1939 Control Equipment	114
Chicago Convention and Show Week	129
Cleveland Convention and Show Week	131
Profits in Air—Plymouth Division, Chrysler Corporation	136
Air Conditioned Insects Save Pest Infected Crops	140
News of the Month	141
Reference Data, 165, 166	145
With the Manufacturers	145
Abstracts	146
Brief Reviews	146
New Equipment	147
Degree-Days for November, 1939	149
Coming Events	150
New Trade Literature	151

Single copies, this issue, $1; to subscribers, 80 cents.

USING THIS ISSUE!

This issue, HEATING & VENTILATING'S 7th Annual Yearbook of Progress, is divided, like the several previous editions, into four major parts. The first, or Winter Section, which begins on page 29, reviews the technical accomplishments of the year in, as well as statistics on, winter heating and humidifying equipment.

The second, or Summer Section, begins on page 67 and is devoted to methods and equipment designed for use in the summer and which accomplish either cooling or dehumidifying or both.

The third section, which begins on page 87, covers equipment which has Year-Round applications or cannot be classified as either summer or winter, while the last section, which begins on page 111, is devoted entirely to Controls and Instruments.

Each of these sections includes a review of the year's new equipment in that particular classification.

Starting on page 129, is a section which outlines the events occurring during the convention and show week of January 15-19 in Chicago, and the events during the convention and show week of January 22-26 occurring in Cleveland. Included is a complete program, floor plans of the exhibit halls and a list of exhibitors.

Current material, consisting of the regular monthly departments, begins on page 135.

Copyright, 1940, by The Industrial Press

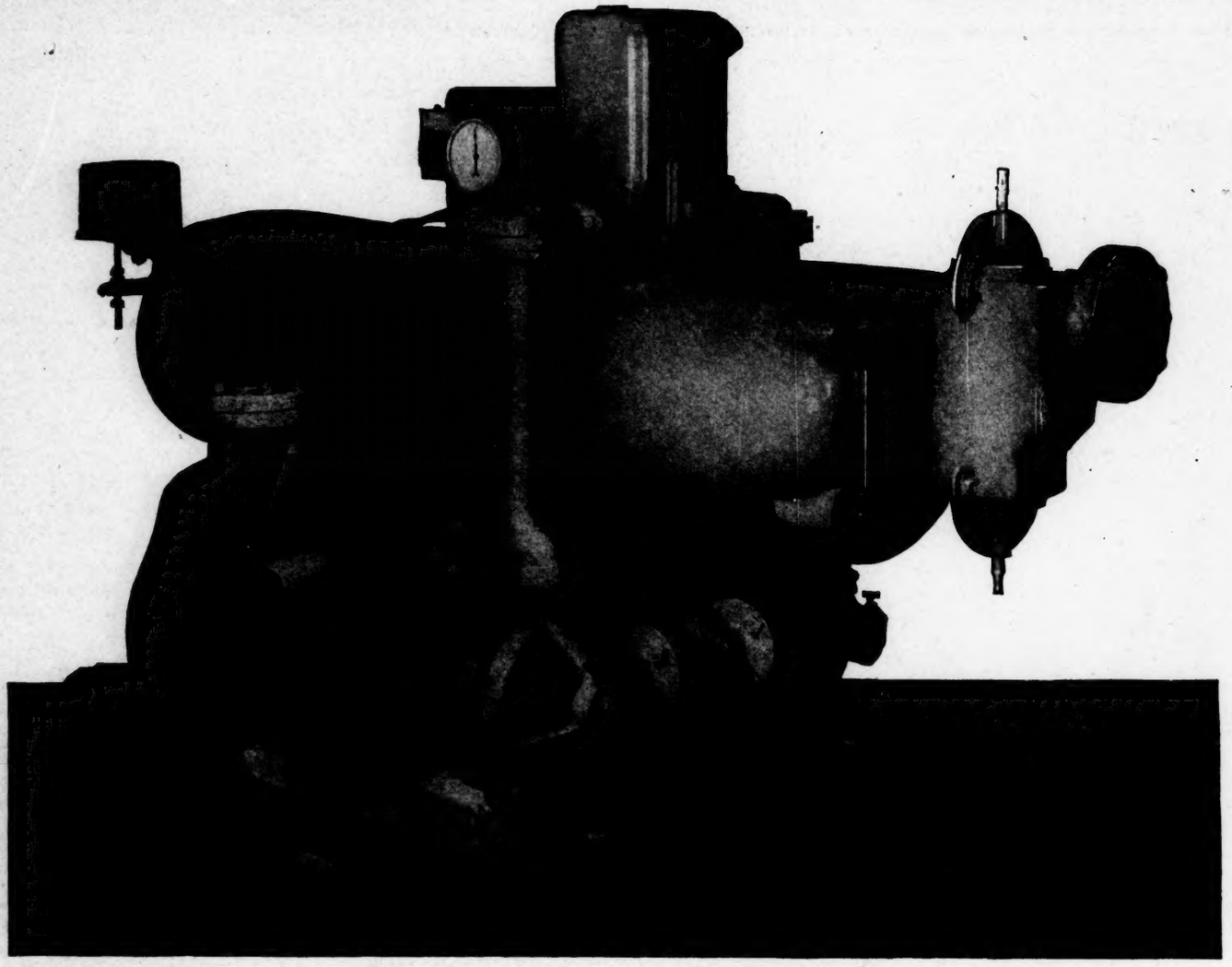
HEATING & VENTILATING is published monthly by The Industrial Press, Robert B. Luchars, President; Edgar A. Becker, Vice-President and Treasurer; Erik Oberg, Secretary. Published at 148 Lafayette Street, New York, N. Y. Western Office, 228 North La Salle Street, Chicago, Ill. Yearly subscription in United States, Spain, South America, Mexico, and Canada, $2.00; in all other countries, $3.00. Single copies, 30 cents. Member of Audit Bureau of Circulation and Associated Business Papers.

VOLUME 37 NUMBER 1

EDITORIAL STAFF

Editor
C. H. B. HOTCHKISS
Associate Editor
CLIFFORD STROCK
Assistant Editor
JOSEPH F. KERN, JR.

Where Heat Must Not Fail— Install this SAFE Heating Pump!



In Hospitals, Greenhouses, Schools, Public Buildings, Theatres, wherever heating systems must not fail, install the Nash Vapor Turbine, for it is entirely independent of electric current failure, and continues to operate as long as there is steam in the system.

More than that, the Vapor Turbine is a most economical pump, for the elimination of electric current does away with current cost, the largest single item in the operation of an ordinary return line heating pump.

Greater savings still are effected by the Vapor Turbine in the system, for the reason that this pump operates continuously. It is the only pump that can do this with economy. Continuous operation means uniform circulation, and uniform circulation saves steam.

The Nash Vapor Turbine has but one moving part, rotating in the casing without metallic contact, and requiring no internal lubrication. Quiet, compact, and trouble-proof. Bulletin A-290 is free on request.

THE NASH ENGINEERING COMPANY

SOUTH NORWALK, CONNECTICUT, U. S. A.

Factory and Commercial Building to Increase; Residence Work to Fall; Total Steady in 1940

Predicts L. SETH SCHNITMAN†

VIEWING the outlook for construction in the year 1940, prospects for factory building are by far the most promising. This is in part due to the speed-up in the aircraft industry and other lines directly related to the war, and to our own scheduled increases in national defense. In part, too, the better outlook for factory construction has its roots in the improvement in industrial earnings which was rather marked during the final half of 1939, and the general belief on the part of industry that the year 1940 as a whole will likely show a higher rate of industrial activity even as against the relatively high 1939 average level.

On the Dodge basis of coverage of the 37 eastern states, factory construction in 1940 should show a total of at least $260,000,000, or an increase of better than 35% over the 1939 volume. Gains should be rather equally distributed between the processing and mechanical industries. Despite this indicated improvement there is now little likelihood that factory building can attain the figure reported for 1937 which amounted to $314,000,000 in the 37 eastern states. However, it it altogether probable that increased industrial earnings recorded in 1939 in many industries, notably in aircraft, will bring in a sizable volume of new equity financing for plant expansion. Then, too, there is a real possibility that the Federal Government will provide a broad-gauged tax concession policy to enable manufacturers who are obliged to expand plants to meet the increased demands growing out of our enlarging national defense program, which if undertaken, will provide further stimulus to industrial building.

Commercial building also is likely to expand in 1940, but here the increase will be much more modest than in the case of industrial building, with the estimated 1940 total of something less than $300,000,000 accounting for an increase over 1939 of roughly 10%. Moderate gains appear likely in commercial garages and service stations, in commercial warehouses and store buildings, while moderate losses are probable in office and loft buildings and bank buildings. Since the indicated improvement in commercial buildings as a whole is only moderate, what changes will occur in the component elements will likewise be quite small, although it is probable that offices and lofts which usually account for about one-fourth of all commercial building, will likely show the greatest percentage of shrinkage, due principally to worsened vacancy conditions in large metropolitan centers.

Viewing non-residential building as a whole, exclusive of heavy engineering projects, the 1940 total indicated for the 37 eastern states will approximate $1,060,000,000, or about 6% greater than the indicated total for 1939. Of this volume private projects will probably represent about 60% of the total, a percentage distribution about the same as that shown in 1939. Besides commercial and factory building, there is included in this total, public and institutional building (partly private) for which some $525,000,000 will be expended in the 37 eastern states in 1940 as against about $560,000,000 for the year 1939.

The most important single class of public and institutional building, that is educational building, will likely show a loss of at least 15% as contrasted with the 1939 volume for this structural type. This is something of a price for war abroad which is likely to be exacted by local governments in an effort to curtail capital expenditures. All other classes of non-residential public and institutional building in the aggregate will bulk about even with the 1939 total of about $350,000,000 for the 37 eastern states. Losses in social and recreational buildings, administrative public buildings, and religious buildings will be about offset by gains in hospital buildings, military and naval building and sundry miscellaneous public and institutional non-residential types largely tied to factors of war and national defense.

Gains over 1939 are estimated for 6 of the 9 major geographic areas in so far as total non-residential building is concerned. Areas that will likely show gains include the Middle Atlantic, the East North Central, the South Atlantic, the East South

†The author needs no introduction to many readers of HEATING & VENTILATING since he has presented his forecast of building construction in the January issue for the past several years. It is to be especially noted that in every case checkup after the year is over has shown that his forecast had been remarkably close. Consequently his forecast for 1940 can be taken as a reliable indication of what can be expected. Mr. Schnitman is in close touch with conditions in the building field having formerly been Chief of Division of the Department of Commerce "Survey of Current Business"; more recently chief statistician of F. W. Dodge Corp.; and now a consulting economist in New York.

NONRESIDENTIAL BUILDING IN THE UNITED STATES, EXCLUDING CIVIL ENGINEERING

By Geographic Districts—Millions of Dollars
(Computed on Basis and Methods of F. W. Dodge Corporation Coverage)

District	1940 Forecast	1939*	1938
New England	$65	$70	$99
Middle Atlantic	300	280	323
East North Central	250	230	244
West North Central	95	95	94
South Atlantic	200	185	157
East South Central	50	45	55
West South Central	100	95	100
Mountain**	30	30	20
Pacific**	160	140	140
Total U. S.	$1,250	$1,170	$1,232

*Partly estimated.

**Figures for Mountain and Pacific Coast States estimated on basis of reported building permits of the U. S. Department of Labor adjusted to give effect to comparable reporting contract basis employed by F. W. Dodge Corporation in the 37 eastern states. Data include alterations and additions just as do the Dodge figures.

Central, the West South Central, and the Pacific Coast districts. For the most part these estimated gains have their origin in war conditions and in our own enlarged program of national defense.

For the Middle Atlantic States (New York, New Jersey and Pennsylvania) the over-all volume of nonresidential building in 1940 will approximate $300,000,000, as contrasted with an estimated total of about $280,000,000 for 1939. For the East North Central area (Illinois, Indiana, Ohio, Michigan and Wisconsin) the 1940 non-residential total will approximate $250,000,000 as against a figure of about $230,000,000 for 1939. The South Atlantic States (Delaware, Maryland, District of Columbia, Virginia, West Virginia, North and South Carolina, Georgia and Florida) will likely show an additional total of about $200,000,000 for 1940 as against only about $185,000,000 in this area for 1939. Estimates for the remaining districts will be found in the subjoined table.

In arriving at these territorial figures approximations of the income by districts took first importance. In addition, such elements as vacancy conditions in commercial space and industrial buildings, general industrial and agricultural conditions, and other purely local factors were given reasonable weightings with added emphasis on factors of national defense where they were likely to apply.

Almost regardless of war conditions, factors now at work make virtually certain a decline in over-all construction in 1940 as against the 1939 performance. Continued warfare abroad practically assures a reversal in construction recovery as a whole coming, as it would, when cyclical forces alone could bring a temporary reversal in the upward trend anyway.

A much brighter outlook for electric utility construction and the likely partial substitution of a huge national defense program for the recent heavy volume of general public works will tend to soften these implications.

In the ten-year period, 1920-1929, a total construction, public and private, in the United States as a whole (U. S. Department of Commerce series) amounted to $117 billions. Of this all-time peak for any decade, $90 billions, or about 77% represented private construction and maintenance expenditures. In no year of that decade did private construction inclusive of public utilities represent less than 71% of the total. What of the decade which began in 1930?

In the ten-year period ended in 1939 construction totaled a bit under $74 billions. Of this amount private construction amounted to something more than $43 billions and represented less than 60% of the aggregate. Public construction in the 1920's totaled some $27 billions; in the 1930's it reached $31 billions. This can now mean only one thing: needed national defense excepted, growing public apathy to public works expenditures on the plane of the 1930's militates against any over-all increase in public construction of nonresidential varieties.

At best any reasonably visible enlarged program of national defense can mean for 1940 no more than $250 millions of construction, running all the way from military and naval buildings down to dredging of rivers and harbors, and this is not enough to offset indicated losses elsewhere. The bulk of these expenditures for national defense construction projects will center largely on the Gulf Coast, the Pacific Coast and on the Atlantic Seaboard, with some sprinkling over into the interior. And it must be indicated that though this be true an enlarged program of national defense would probably involve at least a like amount of construction outside of the continental United States, centering chiefly in the Panama Canal Zone, Hawaii, the Caribbean and in the colonies.

To get the picture of private new building alone for the United States as a whole, exclusive of civil engineering and maintenance, it is now only necessary to indicate that for 1940 the total will range somewhere between $2,450,000,000 and $2,500,000,000 (computed on basis and methods of F. W. Dodge Corp. coverage). This would mean a volume of about 5% lower than the total for 1939. This estimated total includes private residential building and all classes of private non-residential building exclusive of utilities, heavy engineering and farm construction, and *excludes* alterations, repairs, and maintenance, which will amount to roughly $300,000,000 additional.

We are now ready to view the outlook for residential building which always in the past has been the prime mover within the construction cycle itself.

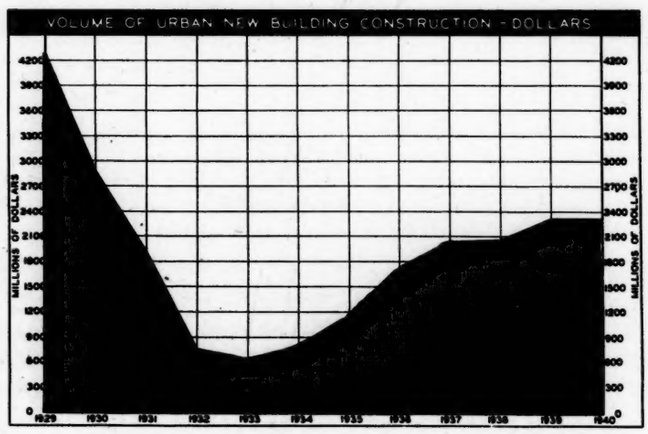


Fig. 1. The major classifications of urban new building during the past decade. This division of building projects is estimated for 1939 and 1940.

RESIDENTIAL BUILDING IN THE UNITED STATES BY GEOGRAPHIC DISTRICTS

(In Millions of Dollars)
(Computed on Basis and Methods of F. W. Dodge Corporation Coverage)

District	1940 Forecast	1939*	1938
New England	$75	$80	$65
Middle Atlantic	420	425	314
East North Central	280	315	218
West North Central	95	100	77
South Atlantic	220	225	180
East South Central	50	50	43
West South Central	110	115	89
Mountain**	35	35	25
Pacific**	200	225	200
Total U. S.	$1,485	$1,570	$1,211

*Partly estimated.
**Figures for Mountain and Pacific Coast States estimated on basis of reported building permits of the U. S. Department of Labor adjusted to give effect to comparable reporting contract basis employed by F. W. Dodge Corporation in the 37 eastern states. Data include alterations and additions just as do the Dodge figures.

Since the 1933 low point, residential building has shown a six-year record of consecutive annual rises. Rarely, if ever, has there been a period where the rising phase of the residential cycle has been able to show as many as seven years of consecutive gains. Though this be purely empiric and of historical significance only, there is much in this background that suggests the probability that 1940 will be an off-year for residential building. The residential building cycle is rather well defined and extends for about 18 years from bottom to bottom, or from top to top.

There are three collateral and perhaps incontrovertible facts that stem from the historical pattern: (1) The rising phase most frequently consumes about 11 years, which is interrupted by one or two off-years; (2) The downward phase of the cycle most usually compresses itself within a period of about seven years; (3) The cycle which follows the one in which a new all-time high has been recorded—the last, in 1925—is always a dwarfed one, attaining a peak which is lower than the one recorded in the immediately preceding cycle.

This latter phenomenon seems understandable enough since it usually requires at least a generation to liquidate the excesses of a housing boom and to bring in a new crop of builders and buyers of housing space in sufficient volume to start the cycle on its customary route toward boom and collapse.

The forces which motivate the residential building cycle through its transit from low to high are dynamic. More important, they are ever-changing in their significance, individually and severally. Though there are many forces that impel builders to build and buyers to buy, there still are only four basic causes, complex though their operations may be, which impel home building operations on any broad scale. True though this still is, we have now arrived at that point in the upward phase of the current cycle where correlations to the national income of rents, building costs, and population increments are of less cumulative significance in shaping the pattern of 1940 than is the current cyclical position of residential building itself.

No factor so tends to dampen the prospects for residential building in 1940 as this element of approaching cyclical maturity. Not even the possibility that the national income will record an advance of as much as 5% over the 1939 figure can at this time alter the conclusion that residential building in 1940 for the nation as a whole will suffer a decline of at least 5% from the 1939 total. This is probable because all other motivating factors, considering their interactions at this stage in the cycle, are about neutralized by the probability that an increased proportion of the national income will find its way into consumers' goods of all kinds, both durable and nondurable, and at the expense of residential building.

Only a rapidly expanding national income that would promise soon to approach an annual rate of let us say $80 billions could materially alter the present implications, and even then rises in the cost of living would have to be confined to relatively modest proportions. Can our domestic economy, war or no war, produce the needed base in the national income and more especially in individual family incomes for a truly important expansion in residential building above current levels, even over and beyond 1940? Probably not, unless at the same time the all but certain rises in the cost of living can be adequately curbed and better balance be afforded among its major component elements.

The item of rentals is a significant factor in the householder's budget. Under the best of circumstances the average householder has only a limited number of dollars to spend. The more he pays for food or clothing or fuel, the less he has available for shelter, unless of course his over-all income improves. And in so far as 1940 is concerned there are now ample evidences that point rather unmistakably to such serious dislo-

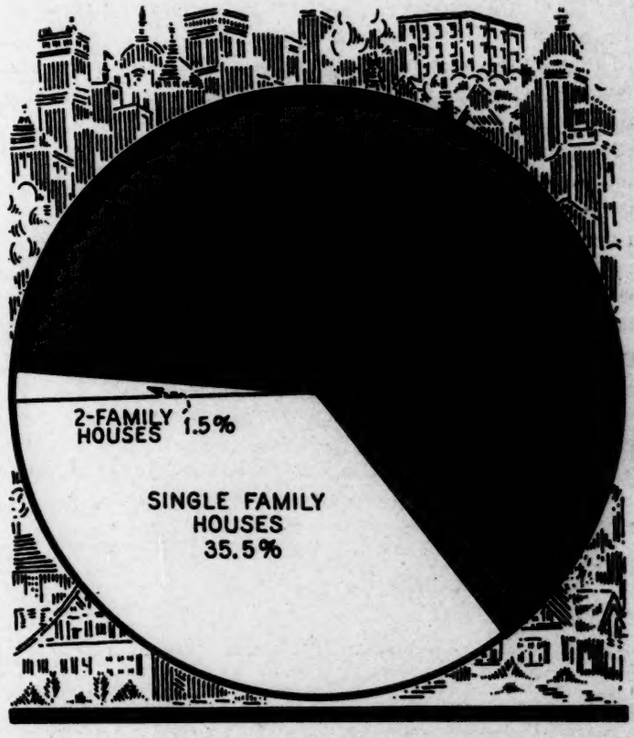


Fig. 2. How new building in 1940 will be divided among the major building classifications. Note that the majority of building will be in other than houses.

Fig. 3. Estimated change of volume of expenditures for new buildings of different types in 1940 as compared with 1939.

cations in the structure of living costs as to provide something of a temporary ceiling for residential building operations by private enterprise. The story would be quite different were rental rates evidencing a rise chiefly as a result of a natural functioning of the elements of supply and demand, for then the impacts of rising costs for food, clothing, furnishings and the like might be negatived materially enough to provide a seemingly sound basis for further speculative excursions in the field of residential building, which in 1939 produced considerable indigestion, temporary though that may be. It is speculative and investment building that gives shape and substance to the residential cycle after it has passed the midway point. And when we find as we now do a relatively large proportion of speculative dwellings erected in 1939 still unsold or unrented, a figure exceeding 10% of the 1939 crop, the hurdle for 1940 becomes doubly difficult.

The significance of investment type housing may be stated in still another way. Back in 1921, measured in dwelling units, apartment house construction accounted for only 14% of the 449,000 dwelling units produced in that year. In 1925, the peak year of the preceding cycle, this housing type represented a bit more than 22% of the 937,000 dwelling units of all types that were erected. For 1927 and 1928 investment type housing as thus defined represented almost 32% of all dwelling units produced in those years. By 1932, this classification had shrunk almost to the vanishing point and represented less than 10% of the total units produced. For 1939 apartment house units accounted for about 24% of the total of 460,000 housing units produced. Any backsliding in this ratio—and such appears indicated for 1940, at least so far as private apartment house units are concerned—is a serious matter, the more so in the light of the probability that in amplitude the present residential cycle will be a dwarfed one.

Only a little comfort can be gained as it affects 1940 prospects from an examination of residential building during the years of the first World War. Then, that is in 1914, we were at the bottom of the cycle that topped out in 1907 and were entering in upon the rising phase of the cycle, interrupted though it was by the disruptions of the war years, that peaked out finally in 1925. This is different now, for today, with war abroad, we are past midway in the ascendant phase that began in 1934, and that makes a really important difference—perhaps the most significant single one—in appraising the outlook for residential building under war conditions, whether we are embroiled in them or not.

Upon valuation of the favorable and unfavorable factors now at play it is probable that residential building in 1940 the country over will approximate $1,485,000,000 for a *loss* of a bit more than 5% from the estimated total of $1,570,000,000 for 1939. Of the estimated 1940 total about $1,250,000,000 or almost 85% will be concentrated in the 37 eastern states (F. W. Dodge Corporation basis of coverage), the remainder centering in the eleven western states.

Taking the nation as a whole some 445,000 dwelling units of all types will be produced in 1940, for a loss of some 15,000 from the indicated 1939 total or a little more than 3%. Losses will center chiefly in one-family houses erected by speculators and in apartment house types; in the latter instance gains indicated for public housing will be more than offset by losses in private apartment house operations. It must be indicated however that in so far as units are concerned it is possible that the total number may slightly exceed that for 1939 because of the extension of FHA insurance to homes costing $2500 and under on the most liberal credit terms in history, unwise though this may ultimately prove to be.

Of the indicated total number of units for 1940 about 325,000 or 73% will be one-family houses. Of these, about 257,000 or almost 80 percent of all one-family houses will have a unit construction cost of under $7,000. On an expenditure basis by far the greatest volume of residential building will center in the Middle Atlantic States (New York, New Jersey and Pennsylvania). This area in 1940 will account for about $420,000,000 in residential building or a little more than 28% of the total for the nation as a whole. What is more, the 1940 volume in these states will practically equal their respective total for 1939. Next in importance will be the East North Central States (Ohio, Indiana, Illinois, Michigan, Wisconsin) where the estimated total for 1940 is $280,000,000, for a loss from the 1939 volume of about 11%.

In the South Atlantic area (Delaware, Maryland, District of Columbia, Virginia, West Virginia, The Carolinas, Georgia and Florida) the 1940 volume is estimated at $220,000,000, only fractionally under the 1939 total for the district. For the three Pacific Coast States (California, Oregon and Washington) the 1940 volume of residential building will approximate $200,000,000 for a decline of about 11% from the 1939

ESTIMATED NUMBER OF NEW RESIDENTIAL NON-FARM UNITS PROVIDED IN THE UNITED STATES

	Distribution By Types			
	Total	In One-Family Houses	In Two-Family Houses	In Apartments
1940 Forecast	445,000	325,000	17,000	103,000
1939	460,000	332,000	18,000	110,000
1938	351,000	264,000	16,000	71,000
1937	297,000	233,000	15,500	48,500
1936*	282,000	211,000	12,000	59,000

*Figures from National Bureau of Economic Research, Inc.; all others are estimates of the author.

total. For the remaining geographic areas the 1940 totals will be within striking distance of their respective 1939 totals, with the likelihood that losses, if they occur, will be less than 5%.

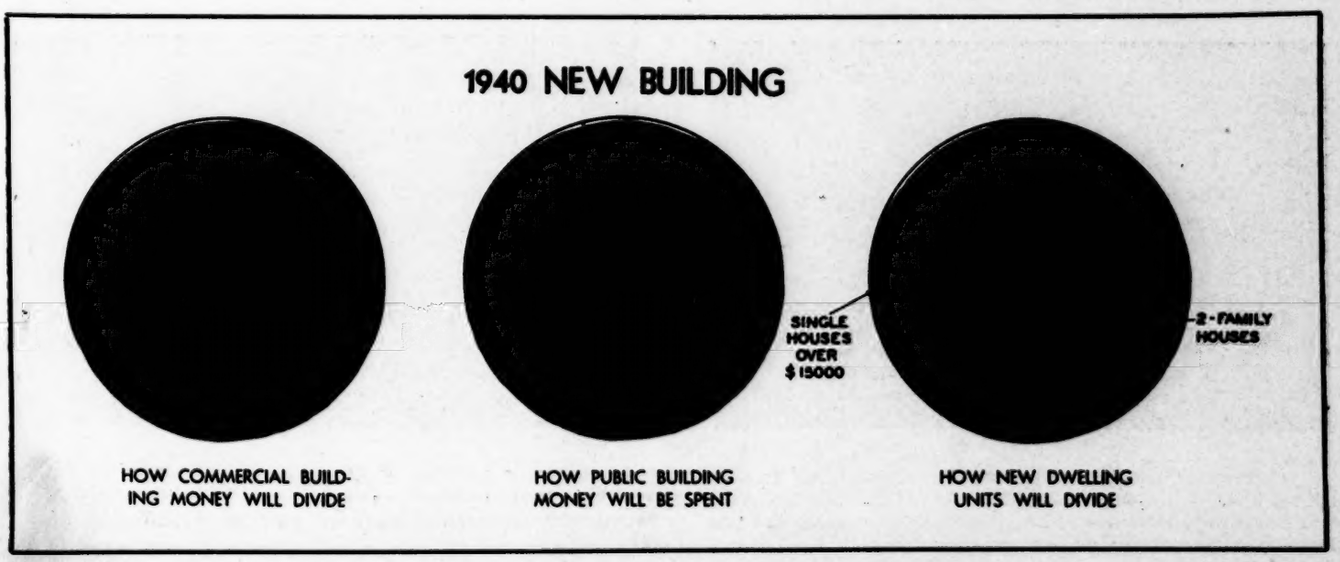
Torn between the dual and somewhat anomalous position of lender on and owner of residential properties still to the tune of some $4 billions our financial institutions, more plaguingly than ever are confronted with the paradox of self-competition. More lending on new residential properties means more building. More building means a larger supply of dwelling space. More dwelling space means greater competition with existing space. And so on and on, with the result that existing holdings giving suitable weight to unrealistically high tax appraisals and going inordinately high tax rates, constitute a serious drag on new construction even though it be true that mortgage money has never before been available to builder and buyer alike on as reasonable and inviting a basis as now obtains. What is needed now is a methodic plan for liquidating foreclosed properties on the basis of realistic market values, for it is of far less moment that currently the rate of foreclosures is lower than at any time in upwards of a decade than that the accumulated overhang of residential property has progressively become a real stumbling-block in the way of further new building on any truly substantial basis. Only bettering prospects for speculative profits in improved real estate can provide a base for significant liquidation of institutional holdings, for at a price the speculator in real estate will assume the risks of ownership and operation. Indeed, at this phase of the cycle this must occur if we methodically mean to provide a sound foundation for the resumption of residential building recovery even after the hiatus that is likely for 1940.

If out of the welter of current conditions building costs were to stiffen markedly, help would come to existing real estate in the form of advancing prices and hence improving opportunities for liquidating foreclosed properties. But this has its obverse side so far as 1940 is concerned if one is mindful of our current position in the cycle, since a rise of as little as 5% in building costs could itself seal the doom for residential building in the coming twelve months. Perhaps the continued efforts of the U. S. Department of Justice in its prosecution of its drive against price-fixing, restraints of trade, alleged monopoly in the building industry running all the way down from manufacturers to and through the labor unions may bring assurance that building costs will remain relatively stable over 1940. But against this must be set the fact that this is a year of transcendent importance politically. Besides a national election is involved the question of fundamental governmental policy on matters never before known to have engaged the concern of the Federal government. If nothing else were needed, here is an element of uncertainty that can and probably will take its toll in generally lowered private construction volume, especially in the field of residential building.

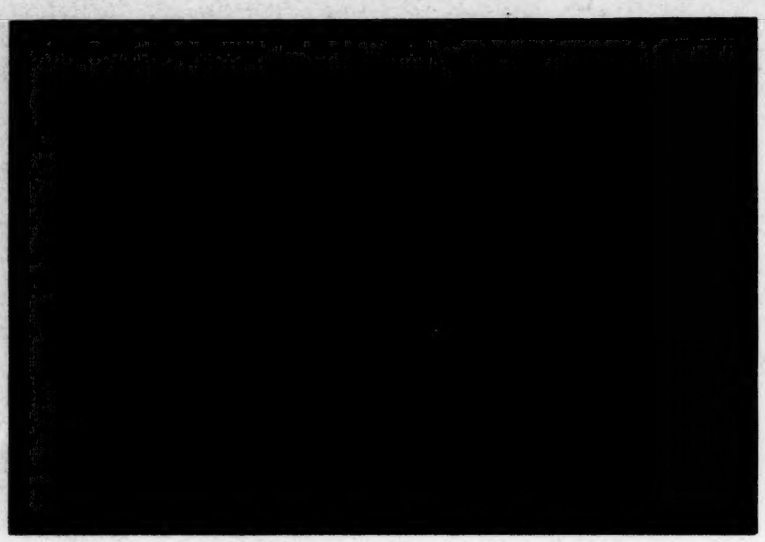
If the Federal Government pursues vigorously its attack on the monopolistic practices of building trades unions the way may finally be opened for an accelerated use of labor-saving construction methods, long stymied by the unions themselves. Such, in bringing about lower costs, would provide a substantial basis for optimism over the remainder of the rising phase of the current building cycle, though its effects would probably be too slow to alter materially the outlook for 1940.

Much disappointment awaits those who believe that by constantly easing the terms of mortgage finance through the FHA instrumentality we can provide the sesame to a residential building boom, even were such desirable. Cyclical position considered, the answer to larger activity than now obtains lies chiefly in the ability of private enterprise to hurdle the rigidities imposed by going construction costs, foreclosed properties, and a distorted structure in the national income, wherein an unhealthy proportion is provided out of public treasuries.

The challenge to private industry has never been greater. Nor has there been such need as exists today to meet it, especially now that industrial activity as a whole has struck the tempo of 1929 in spite of a languishing in private building. For the surest way to bring on a reversal in the going rate of industrial production is to permit building to slip from its recent stride, slow as that has been in contrast with the accustomed pace of the 1920's. The challenge will not successfully be met out of legerdemain.


1940 NEW BUILDING
SINGLE HOUSES OVER $15000
2-FAMILY HOUSES
HOW COMMERCIAL BUILDING MONEY WILL DIVIDE
HOW PUBLIC BUILDING MONEY WILL BE SPENT
HOW NEW DWELLING UNITS WILL DIVIDE

Indexes Indicate



1 The combined trend of summer and winter air conditioning. The fluctuations in the winter air conditioning are based on the annual variations of HEATING & VENTILATING's Index of Heating Business Activity, while those in summer air conditioning are based on reports from electric utility companies. The base is 1929 = 100.

2 Trend of business activity in the heating industry as compared with general industrial and merchandising activity. Both indexes are seasonally adjusted. Heating business activity curve does not include summer air conditioning. Base, 1929 = 100.

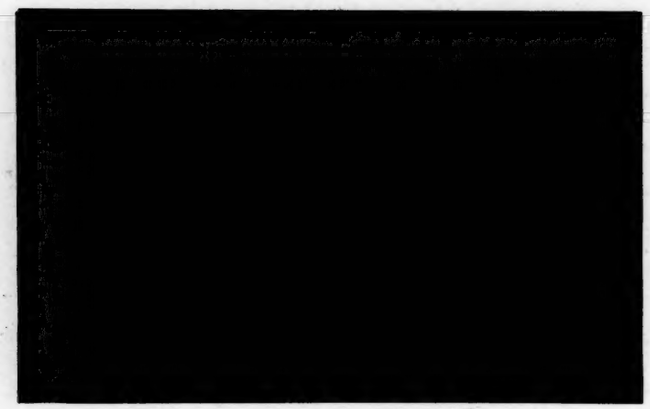
The year 1940 is expected to be one of exceptional activity in industrial and commercial building but with the total volume of new construction about the same as last year.

The opening sentence on this page one year ago was that "All signs and portents indicate more volume of business for 1939." Chart 1, which gives an over-all picture of the heating and air conditioning business, shows that the statement was fully justified; it indicates that the estimated volume of the industry's total business for 1939 was at 69% of 1929 levels as compared with 55% in 1938.

Following the plan pursued for a number of years, the feature of this issue is the Yearbook of Progress. In each of the four sections of this annual review there is included, where possible, detailed statistics on the business trends of various branches of the industry. On these opening pages, however, the detailed statistics have been combined and condensed so as to bring out the essential picture without obscuring it by too much detail. Altogether there are twenty-eight statistical charts in this issue, all of which are plotted on an annual basis excepting five of those on these two pages.

Chart 1 shows the relative fluctuations in business in what is primarily summer and what is primarily winter air conditioning, with all straight heating (of buildings) included with the latter. Beginning with 1930, when the winter functions accounted for 98.5% of the total business

3 A seasonally-adjusted index of combined business in oil burners (conversion burners, boiler-burner units, and furnace-burner units), heating stokers, and central gas burning equipment. The base is 1929 = 100.



4 Trend of common stock prices of 11 industrial firms who manufacture heating and air conditioning equipment, although several manufacture other products as well. The base is 1929 = 100.

Steady Movement in Most Lines

until 1935, when they accounted for 89% of the total, winter heating relative to summer conditioning showed a lessening in importance. However, excepting only 1937, since 1935 the winter functions have steadily increased in value of business until in 1939 they accounted for 93% of the total.

It should be pointed out that Chart 1 is based entirely on building installations and does not include railroad car conditioning.

As everyone connected with the industry knows, heating business is highly seasonal. In order to eliminate the seasonal characteristic from reported figures, HEATING & VENTILATING introduced in 1933 its Index of Heating Business Activity, plotted in Chart 3. This index eliminates the seasonal factor and shows, in a single figure each month, the trend of heating business as indicated by sales of radiators and convectors, cast iron and steel heating boilers, gas boilers and oil burners. In order to provide a basis of comparison, an index of general business is plotted on the same chart. This latter index is based on carloadings, steel mill activity, lumber production, cotton forwardings, automobile production and electric power production.

Based on 9 months' figures, the Heating Index averaged 78.3% (of 1929) in 1939 with indications that it may average as high as 80% for the year. This compares with 61.4% in 1938, 80.2% in 1937, and 80.5% in 1936. The general trend of the Heating Index follows that of general business generally, with every indication that both are headed upward toward the close of the year.

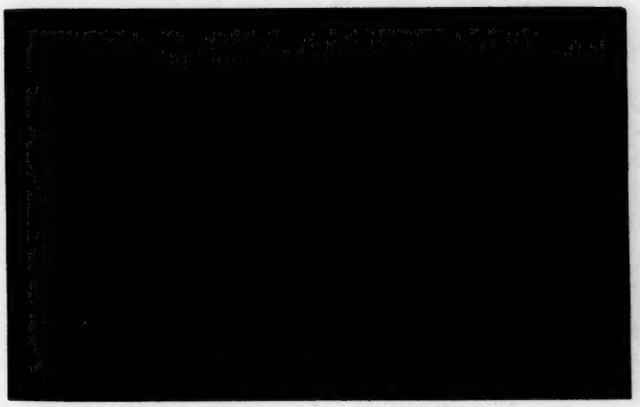
The trend in the physical volume (number of units) of automatic heating is reflected in the Index of Automatic Heating, Chart 3. This index has three components—oil burners, gas boilers, and stokers. Each of these is corrected for its own seasonal variation and, when weighted, makes up the total. This chart seems to indicate that automatic heating business in 1939 would have passed all previous years by far in volume had it not suddenly reversed its direction in September. The war may have been the cause of this, but on the other hand the general heating index has been rising since July. However, even with the sudden decline in early fall, the average for the year in number of installations is considerably above that of 1938. Further information on automatic heating appears on one of the following three pages.

A graph of an index of stock prices appears in Chart 4. The stocks of relatively few manufacturers of heating and air conditioning equipment are listed on the stock exchanges; a number of manufacturers whose stocks are listed do not confine their operations to products of this industry. The index, then, is confined to listed stocks and in observing the trend of the index it should be kept in mind that it is influenced by activity in industries other than our own.

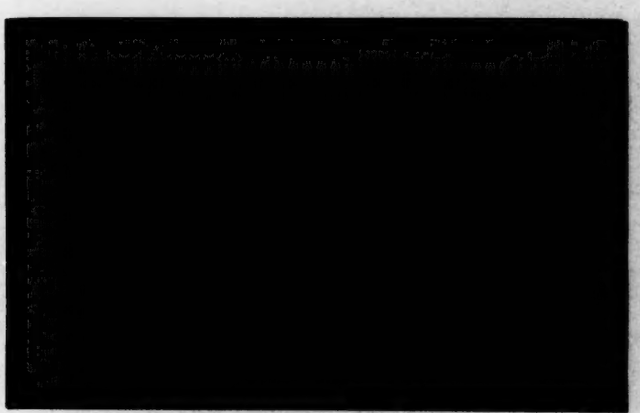
Chart 5 is an index of wholesale prices as compiled by the Bureau of Labor Statistics and recomputed to a different base. The chart is presented for what it is worth, but it is not believed to be wholly representative of price fluctuations in the industry in general; in fact this index includes only cast iron boilers and radiators and a few plumbing items.

The trend of employment in certain classes of the industry's manufacturing plants is shown in Chart 6. The last available figures as this is written indicate an appreciable gain. This chart is not corrected for seasonal variation.

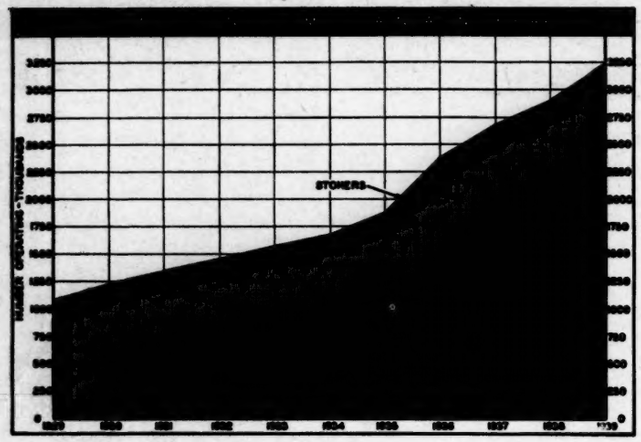
On the three pages which immediately follow are other key indexes in more detail. Tables and graphs relating to specific equipments will be found in the four major sections of this 7th Yearbook of Progress.



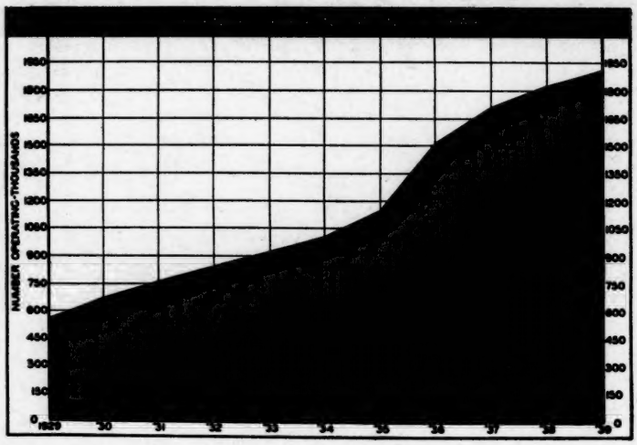
5 Trend of prices of some few items of heating equipment—round boilers, sectional boilers and radiators. The index is that of the U. S. Bureau of Labor Statistics converted to a 1929 = 100 base.



6 The trend of employment in industrial plants making heating apparatus and steamfittings. The curve is based on the U. S. Bureau of Labor Statistics index, converted to a 1929 = 100 base.



7 Estimated number of automatic heating installations operating at the end of each year, totaling the estimates plotted in Charts 8, 9 and 10.



8 Estimated number of oil burners operating in the U. S. at the end of each year and used for the heating of buildings. Allowance is made for burners removed.

Automatic Heating

From the best available figures it is estimated that there were 364,000 automatic central heating installations in residences made in 1939, as compared with 266,800 in 1938. Of these 1939 installations, 221,600 were oil (conversion burners, boiler-burner and furnace burner units), 89,400 were stokers, and 52,900 were gas (conversions, gas designed boilers and gas designed furnaces). As compared with 1938, the increases in per cent were: oil, 53%; gas, 42%; stokers, 5%. This is a sharp change in trend from some of the past years, when stokers were showing startling increases and oil burners rather indifferent gains.

Of the 1939 installations, then, 61% were oil, 14.5% were gas and 24.5% were stoker fired, as compared with 54% oil, 14% gas and 32% stoker in 1938.

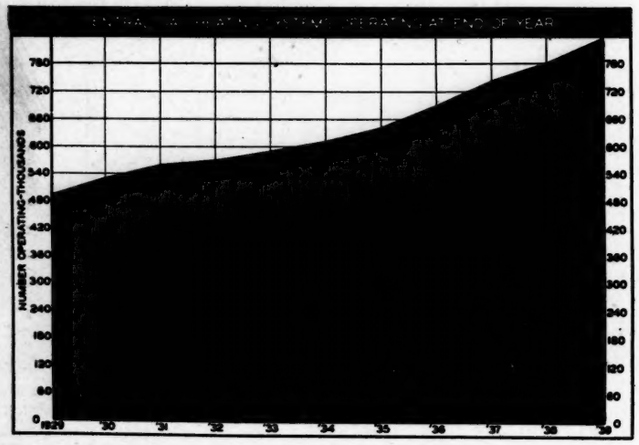
The number of automatic heat systems installed during the year less the number removed or destroyed brings the estimated total number of such jobs operating to 3,212,000, as compared with 2,948,000 at the end of 1938. Of the number operating at the end of 1939, 61% were oil, 26% gas and 13% stoker fired. This compares with 1938 figures of 62% oil, 26.5% gas and 11.5% stoker.

Charts 8, 9 and 10 on this page show graphically the trends in the estimated number of automatic central residential heating plants operating at the end of each of the past 11 years. Allowance has been made for removal of old burners. The figures of charts 8-10 have then been plotted on one graph, Chart 7, to show the trend of all automatic heating.

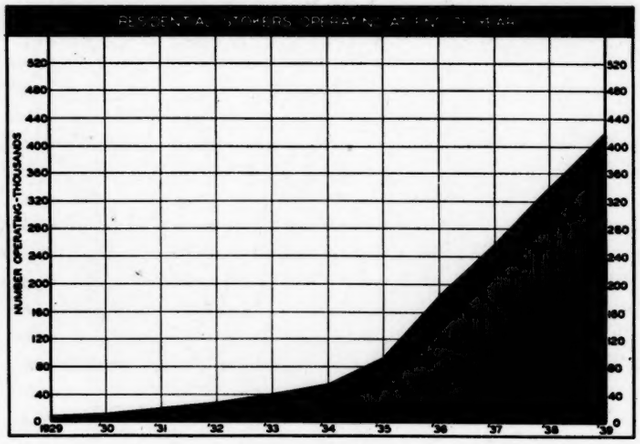
Table I shows the comparison of 1939 and 1938 sales of oil, gas and stoker equipment:

TABLE I—1939 AUTOMATIC HEAT EQUIPMENT SALES

Equipment	Change Over 1938
Conversion oil burners	+ 50.3%
Conversion gas burners	+ 37.2%
Anthracite stokers	— 14.7%
Bituminous stokers	+ 9.4%
Oil boiler-burner units	+ 67.1%
Gas-designed boilers	+ 6.9%
Oil furnace-burner units	+ 77.0%
Gas-designed furnaces	+ 62.0%



9 Estimated number of central type gas heating plants operating at the end of each year, including gas designed boilers and furnaces and conversion burners.



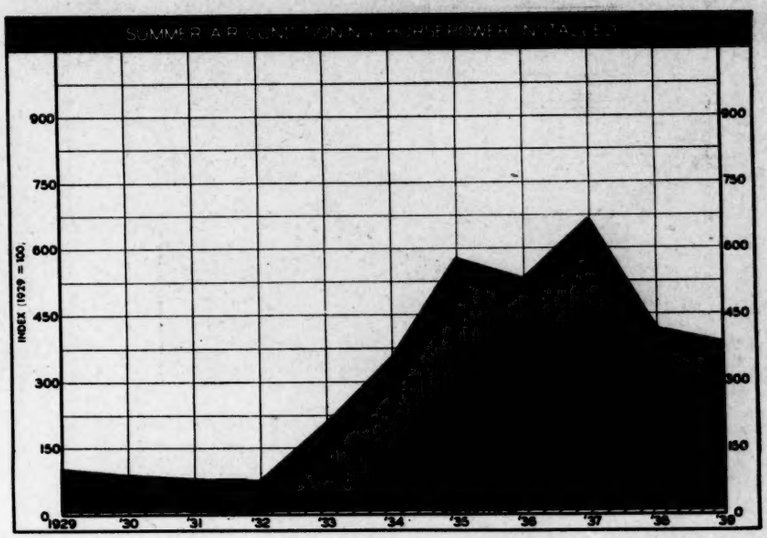
10 Estimated number of residential heating stokers operating at the end of each year, including both anthracite and bituminous burning units.

ANNUAL SALES OF SUMMER AIR CONDITIONING

The precipitous decline of summer air conditioning in 1938 was checked in 1939, and in fact this business showed a small (3%) increase over 1938 so far as building was concerned. Railroad car air conditioning continued to decline to the extent that the overall graph, Chart 11, showed a small drop from 1938. In other words, summer air conditioning continued to be somewhat disappointing in volume of business during the year.

Commercial buildings again accounted for the lion's share of the building air conditioning for summer use. The following table shows the proportion of the total business (in buildings only) which was in commercial buildings in each of the past 11 years:

Year	Per Cent of Total in Commercial Buildings
1929	3.3%
1930	3.9
1931	5.3
1932	6.6
1933	6.7
1934	64.0
1935	66.0
1936	79.0
1937	74.0
1938	66.0
1939	77.5



11 A breakdown of the summer air conditioning business in different types of buildings and in railroad cars for recent years. Figures, excepting those for railroads, are based on reports by electric utilities and adjusted to estimate the total volume throughout the country.

Theater and industrial building continues year after year without sharp changes. Residential building, according to reports, declined in 1939, while public building, due to slackening of the Federal program, has fallen off sharply. It is believed that railroad car conditioning is approaching saturation.

Further and more complete summer air conditioning statistics will be found in the Summer Section.

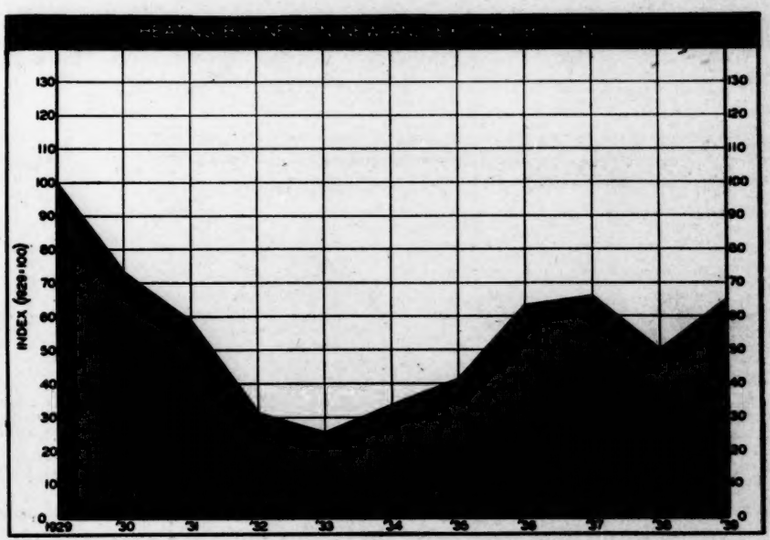
HEATING BUSINESS IN NEW AND OLD BUILDINGS

Chart 12 is an estimate of the division of heating business on the basis of installation of heating equipment made in new buildings as compared with that in existing buildings, with the total of the two relative to 1929=100. Approximately 45% of all the business done by the heating industry in 1939 was due to installations in existing buildings, a greater percentage than in 1938. The following table shows the percentage of business in these two classes for the past 11 years, with the sum of the two columns equaling 100% each year.

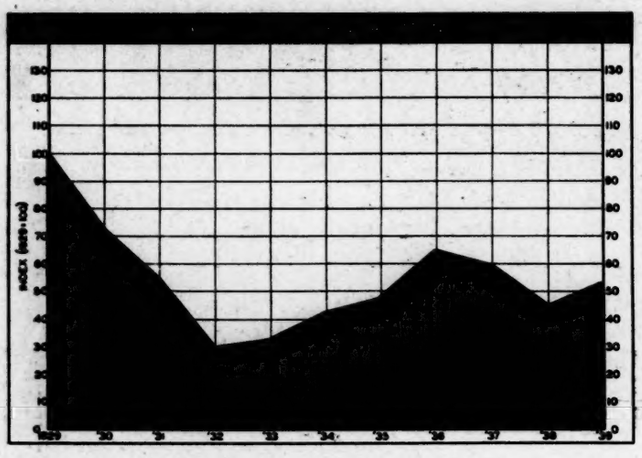
Year	Per Cent of Total Heating Business	
	From New Buildings	From Existing Buildings
1929	67	33
1930	58	42
1931	49	51
1932	35	65
1933	39	61
1934	35	65
1935	43	57
1936	43	57
1937	48	52
1938	63	37
1939	55	45

As shown in the table, existing buildings accounted for only 33% of the total heating business in 1929, after which this ratio rose steadily till old buildings accounted for 65% in 1932 and 1934. The ratio then declined until 1938 when it reached 37%.

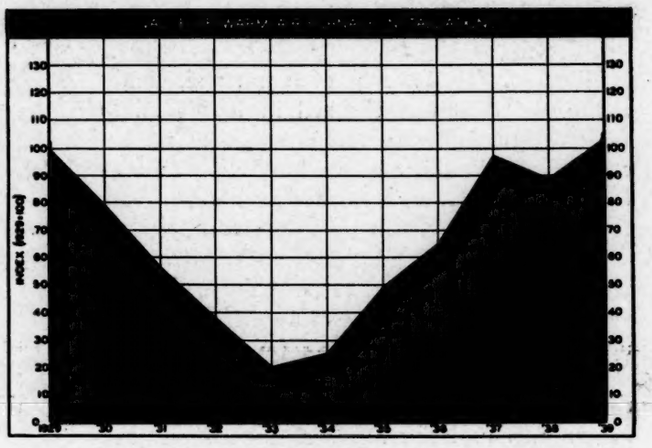
It should be noted that that part of the business credited to old or existing buildings includes not only old plants which have been modernized, but also equipment sold for all repairs.



12 How the sale of heating equipment (not including summer air conditioning) is divided between new buildings and existing buildings. This curve is based on construction census data, new building figures, the index of Heating Business Activity, and the heating equipment price index.



13 An estimate of the total value of the boiler business. This includes oil, gas, steel, and round and sectional cast iron boilers. The value is based on cost of boiler installed but without connections.



14 An estimate of the total value of the warm air furnace business. Oil and gas furnaces, as well as coal-fired steel and cast iron units, are included. The figures include the installed cost exclusive of connections.

Value of Business

The charts on this page relate to the value of four important, but not mutually exclusive, branches of the heating and air conditioning business. The basis of the charts is the estimated dollar value of these businesses but presented in terms relative to 1929 rather than in dollar volume.

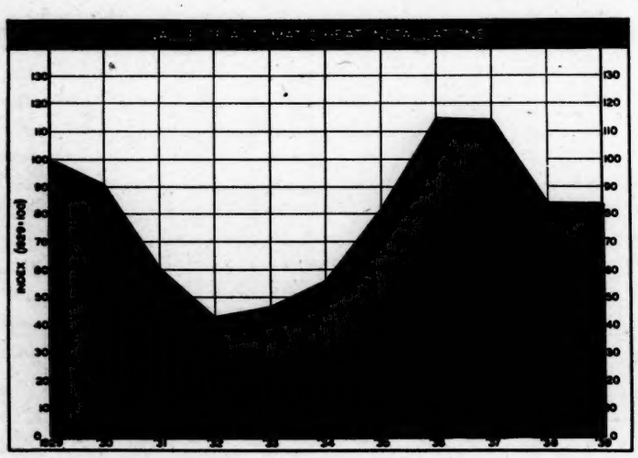
Chart 13 shows the trend of boiler installations in both new buildings and for modernizing. Included are sectional and round cast iron boilers, oil burner boiler units, steel boilers, and gas boilers. The average cost included the cost of the boiler and labor, but did not include piping, radiators or other connections. The yearly value was then divided by the 1929 value to obtain the index number.

The chart shows an appreciable rise in 1939 as compared with 1938. A most interesting point about the graph is in its comparison with Chart 14 relating to furnaces. According to Chart 13, the boiler business in dollar volume is now at about 53% of the 1929 volume, while the furnace business, shown on Chart 14, is at 103% of the 1929 level. The relatively high level of the furnace business has been attained since the bottom of the depression, for the furnace business in 1933 was at 18% of 1929 levels while the boiler business reached its low in 1932 at 28% of 1929 levels.

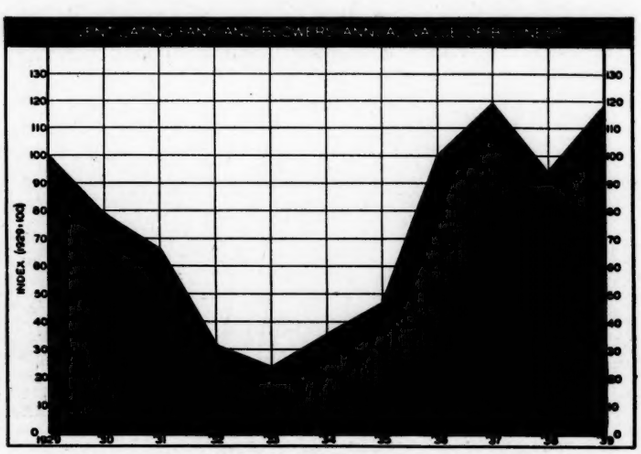
Chart 14 includes the estimated cost of cast iron furnaces, oil furnace units and gas furnaces plus the cost of installing, exclusive of connections.

Automatic heating, covered by Chart 15 is devoted to the sum of the estimated costs, including installation, of conversion oil and gas burners, oil burner furnace and boiler units and gas designed furnaces and boilers plus average cost of installation. Two reasons account for this curve showing neither a rise nor drop: (1) the number of installations probably did not increase so sharply as reported figures indicate in the case of conversion oil burners, and (2) there was sufficient decline in estimated average cost through the year to offset the actual gain in number.

Chart 16 differs from the others on this page in that the value is in terms of manufacturers' selling price which does not include dealers' profits or installation.



15 An estimate of the total value of the automatic heating business. Included is the installed cost of oil burners, heating stokers, and central gas-fired equipment. The values do not include heating system cost.



16 Index of the value of the fan and blower business, with 1929 = 100. Includes large and small blowers, propeller fans and motors. 1929 and 1930 estimated. Later figures from manufacturers' reports.

fedders *Presents*

A NEW LINE OF TYPE *K* HEATING COILS

Heating men will find their construction, and consequently their performance, the result of 44 years of continuous heat transfer experience.

Their features include patented full-floating relief of over-all expansion stresses, and "knee action" relief of differential expansion between individual tubes... spiral fins are pressure wound and metallically bonded on seamless copper tubes . . . entire surface is tinned for protection against corrosion . . . integral orifices and scale breakers . . . generously large cylindrical headers.

Husky, rigid ARMCO ZINCGRIP casings assure adequate protection against piping stresses and coil distortion. Casings are only 9" deep,—made possible by Fedders exclusive methods of full expansion relief. They provide compact size, extreme strength, and long life, trouble free service.

CATALOGED IN AN EASY-TO-USE DATA BOOK

Fedders Type K Heating Coils are built in a complete range of sizes, capacities and dimensions to fit your installation requirements . . . reserve your personal copy of Catalog H-601 right now.

FEDDERS UNIT HEATERS

Fedders handsome, sturdy cabinets . . quiet operation . . exclusive streamline tubes and non-clogging fins are approved by Heating Experts everywhere.

MAIL THIS COUPON TODAY!

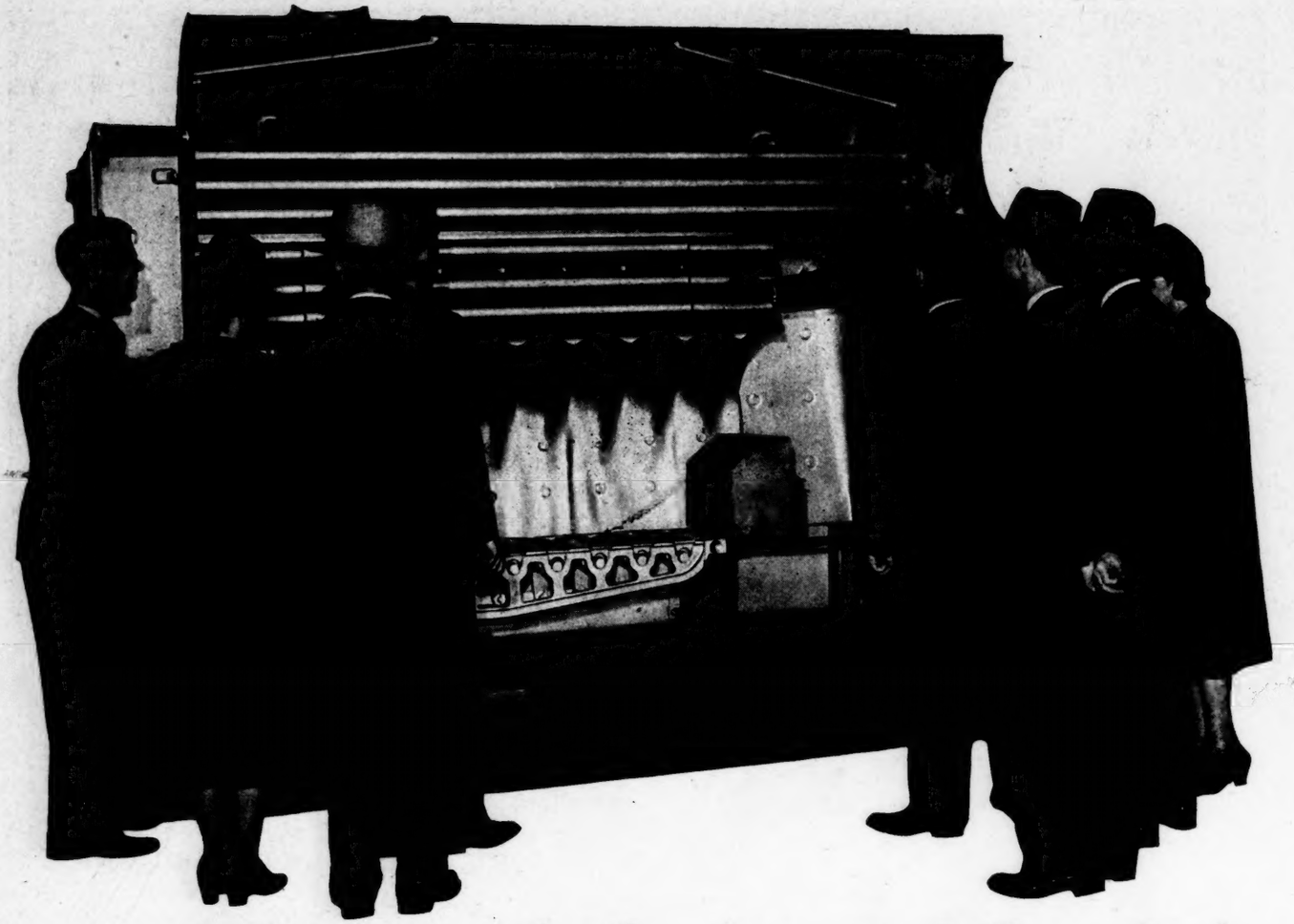
FEDDERS MANUFACTURING CO., *Heating Division*
79 Tonawanda St., BUFFALO, N. Y.

Kindly send me copy of your latest Catalog-Hand Book. No. H-601, on Type K Heating Coils ☐; Fedders Unit Heater Catalog 573 ☐.

NAME .....

CONCERN .....

STREET .....



Let's look inside the Largest Selling Boiler

TYPE C KEWANEE

with the CORRUGATED! CROWN SHEET

The "sawed-in-two" Type "C" Kewanee which attracted so much attention in the Kewanee exhibit at the New York World's Fair, graphically illustrates why this boiler has become the *largest selling boiler for heating big buildings.*

Note Specially These Features:

√ CORRUGATED CROWN SHEET adds extra effective heating surface while rugged strength is imparted, by the massive ridges of the corrugations. Note also that the arched crown sheet is right-side up . . . self cleaning and self draining.

√ BIG, HIGH FURNACE essential to complete combustion is provided in every Kewanee Type "C".

√ FLUES WITH SUFFICIENT AREAS to handle the expanding volume of hot gases as they travel back and forth while the heat is being transferred to the water.

√ LARGE WATER CONTENT Ample in volume to absorb the rapidly created heat and keep itself in active circulation . . . with unbroken steam release surface for drier steam.

√ PLENTY OF STEAM SPACE insures a continuous flow of dry steam into the heating system.

See Kewanee Type R Residence Boilers at Cleveland's 6th International Heating & Ventilating Exposition.

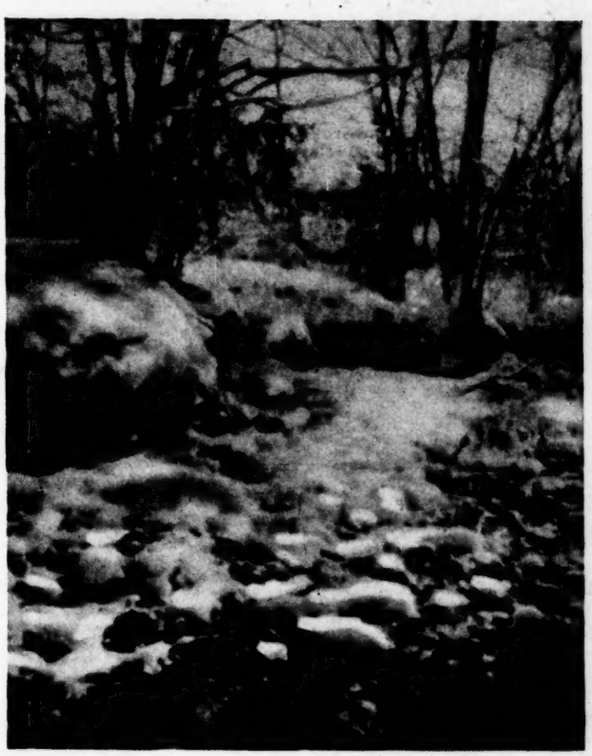
KEWANEE BOILER CORPORATION
KEWANEE, ILLINOIS
Branches in 44 Cities—Eastern District Office: 37 West 39th St., New York City
division American Radiator & Standard Sanitary Corporation

All Kewanee Products may be purchased on easy payments under FHA terms thru our Finance Corp.

140

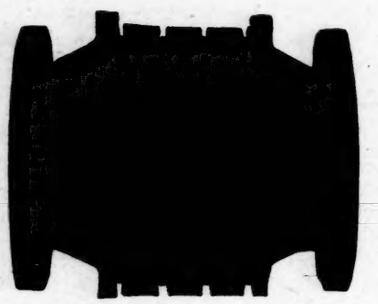
WIN

HEATING AND



BADGER EXPANSION JOINTS

3 Values Worth Buying



A full description, list prices, sizes and other important data are given in Bulletin 100. Send for your copy.

» They have the Directed Flexing Corrugations and Companion Equalizing Rings. These solve the problem of keeping flexing stresses distributed.

» Throughout their entire fabrication, they are given the most thorough heat treatment science has yet devised. The problem of metal fatigue has been largely overcome.

» They have back of them some fifty years of experience not only in manufacturing the corrugated type of expansion joint but in studying and solving pipe expansion problems. With BADGER Joints, the question of uncertainty doesn't arise.

And, of course, BADGER Expansion Joints require no packing, hence no servicing. When expending good money for expansion joints, why not be certain with BADGER Joints, the joints made by . . .

E. B. BADGER & SONS CO.

75 PITTS ST., BOSTON, MASS.

AGENTS IN PRINCIPAL CITIES

Large Increase in Sales Volume Marks 1939 as Construction of New Buildings Mounts

IMPORTANT in the year's events was the great expansion of new-building construction to a total dollar volume exceeding anything since 1929. Heating methods and equipment developments were affected sharply by the fact that this expansion took place in two directions. One was the huge growth of residence construction especially during the early months and the second was the sharp rise of industrial construction during the closing months of 1939.

While the rise of industrial construction was sharp, and while 1940 opens with promise of still further expansion of industrial building activity, the growth took place so late in the year that it did not result in the appearance of much distinctive equipment or much change in methods from those already in use. Such changes were just making themselves felt as the year closed.

With new construction so active in residences there were several points of sufficient present interest and of enough promise for the future so that they are singled out for further attention. They are (1) the chief points in the competition in residence heating methods; (2) moves to improve ratings and installations; (3) developments in equipment and methods aimed specifically at meeting the requirements of heating for low cost residential construction; (4) developments in apartment house heating; and (5) developments in warm air heating practice.

Topical treatment is also given to moves to extract sun heat for supplying hot water for service purposes and for building heating. Also attention is directed toward steam and hot water heating, toward district heating, while statements are available from authorities able to outline what has taken place during the year in connection with the several fuels competing for the heating market and tables and charts are also included.

Competition in Residence Heating Methods

Competition for the residence heating market is nothing new. Naturally in such a situation most changes in position among the competitors are gradual and a real upheaval would scarcely be expected to take place in so short a period as one year. Absence of definite statistics also makes any evaluation of the rate of change particularly difficult. The central methods appear to have about held their own as against stoves, room heaters and the like for a long period, although here the absence of real statistics is especially deplorable. So far as central heating is concerned there is still the same absence of correct information but it is generally conceded that over the period of the past few years warm air methods have come to the front so rapidly that 90% of the new detached residences using central heating have had warm air in some form, either gravity or forced circulation installed. This leaves steam and hot water to split up the remaining 10% of centrally heated residences, but it should be carefully noted that in all such estimates the 10% is by *number* of installations and not by value. (On a value basis the percentages would be quite different.) So far as can be concluded the percentages just stated did not change perceptibly during 1939 but it is believed that during the past months the use of hot water heating systems has grown in popularity. To what extent this has been at the expense of steam systems and to what extent at the expense of warm air heating is not known.

During 1938 and preceding years a few apartment houses were constructed in which heating was accomplished by using warm air methods with the individual apartment as the unit of heating plant installation. In the January, 1939, issue of HEATING & VENTILATING attention was called to this situation and the suggestion was made that it might represent the beginning of a definite trend. From what information is at hand now this practice did not expand notably during 1939 and it is thus still impossible to determine whether warm air methods will find general use in apartment buildings.

Costs of equipment are believed to be the most decisive factor in determining the choice of methods in residence heating. This appears to be a more weighty consideration than fuel cost generally. Comfort and automatic control are also of great importance. It is felt by some that comfort and control are being sacrificed unduly in meeting price requirements on warm air equipment and that such a situation bears the seeds of its own undoing in the long run. This is, however, still a future consideration and there was no convincing evidence produced during the year to indicate that the present methods and equipment used in warm air heating are not meeting with public approval.

Moves to Improve Ratings and Installations

With total installed cost so important there is a natural tendency to cut the corners wherever possible. This is reflected in overstating of equipment performance on the part of manufacturers and of a tendency to keep costs down by poor equipment construction and by the use of slipshod installation methods, cheap ma-

terials and bad workmanship on the part of contractors, dealers and real estate developers. Potentially important moves to put a stop to such practices took place during the year with FHA occupying an important role.

Federal Housing Administration is concerned among other things with insurance of mortgages on small houses and on large rental projects as well. Its examination of the properties to determine insurability includes attention to the adequacy of the heating equipment provided. Acting in this capacity FHA is in a position to exert a strong influence in seeing that heating is properly taken care of in the plans before construction and to check through to see that the plans are actually carried out. It was partly due to this situation that moves were made in 1938 looking toward the establishment of definite standards of construction, installation, and operation of important items of equipment for use in buildings on which FHA insures the mortgage. During 1939 one of these sets of rules—that on mechanical draft oil burners—was adopted as a commercial standard under the procedure of the National Bureau of Standards.

Similarly, a testing and rating code on cast-iron boilers has been in process of formulation for several months. It was adopted by members of The Institute of Boiler and Radiator Manufacturers and several boilers were tested at the Bureau of Standards during the year in accordance with it. This code is known as the I-B-R Code. Due to the necessity of making minor changes in the test procedure the test code has not been made public. However, it is anticipated that the full test code will be ready very shortly. At a meeting early in December a majority of the members of the Institute voted in favor of the adoption of I-B-R ratings for low-pressure cast-iron boilers to take effect as of January 1, 1940. It is expected that as soon as possible those manufacturers will issue revised catalog data carrying the I-B-R ratings on boilers having grate widths up to 20 in. It is also expected that rating data on larger sized cast-iron boilers will be added as soon as practicable.

The National Warm Air Heating and Air Conditioning Association is also reported to be moving toward the adoption of a performance code for warm air furnaces.

A movement of the same general character took place in the gas industry when a committee of the AGA sponsored the preparation of a set of rules covering the application of gas-burning house heating equipment which was published during the year as the Gasco Installation Guide.

Thus there are now rules in existence and others in process of formulation which are expected to bring about better rating and installation practices generally in residences.

Heating for Low-Cost Housing

Following a long period when little attention was paid to improving the methods of heating in use in low-cost housing, recent years have seen constantly growing attention directed toward this particular field. This has been the result of a great many factors including (a) gradual realization that low-cost housing is extremely important, (b) private and governmental experiences in the field, and (c) to a ceaseless agitation directed at arousing active interest in providing low-cost housing throughout the country.

Attempts to devise sufficiently low cost equipment and methods for use in this kind of construction have been directed along a variety of lines and have been conducted by a good many agencies both private and governmental.

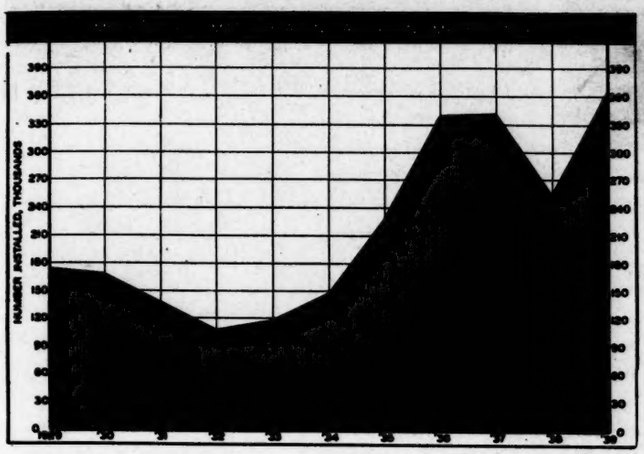
It is not possible to give attention to, or even to list, all of the activities in this connection but the following paragraphs summarize some of the developments during 1939 which were undertaken or carried on by governmental agencies.

The United States Housing Authority, whose duty it is to provide low cost housing through co-operation with local housing authorities, was responsible for a large construction program during the year. Virtually all construction projects of this agency are of the multiple-housing type and frequently consist of groups of apartment buildings. Heating for these buildings must be of low cost per family unit, and methods have been in course of development for some years. How the heating was accomplished in some of the early low cost projects was described in HEATING & VENTILATING, June, 1936, page 33 and May, 1937, page 33. As a result of the crystallization of this early experience U. S. Housing Authority issued Bulletin 20 under date of March, 1939 which outlines the accepted procedure in designing the heating installations in U.S.H.A. projects, and serves as a guide for engineers. It may be said to furnish a rather complete outline of the points to be given consideration in deciding on such an installation and also indicates how to go about evaluating some of these points.

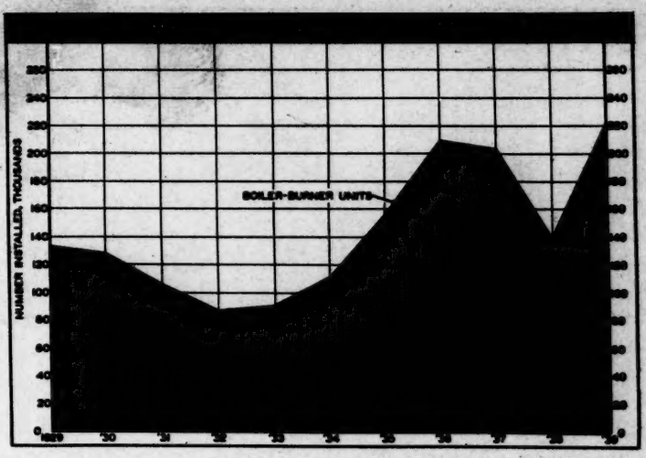
During the course of its dam construction work TVA has had occasion to build small houses at some of the dam sites to house the working staff. During the winter of 1937-38 and 1938-39 certain studies were made in connection with the heating of these small houses and results of interest appeared in a pamphlet "Studies in the Heating of Small Houses" published by TVA in June, 1939. This booklet is for the information of technicians and is not generally available. Tests were conducted in four small, single-story, four-room frame houses and the test houses were occupied during parts of the reported studies. In the course of the study a central house-heating method thought to be especially desirable for these houses was developed and appeared to offer some promise for commercial purposes. A well insulated house was reported to show a reduction in heat loss of 45% over uninsulated.

Central Housing Committee was formed to look after joint interests and study joint problems of all government bodies interested in housing. As early as 1937 an appropriation to support a research program on technical subjects as outlined by this group was made available. The program is broad and is being carried out by the National Bureau of Standards with a large part of it actually being performed at the Bureau. Among the projects included is one having to do with heating equipment and plant for low cost housing.

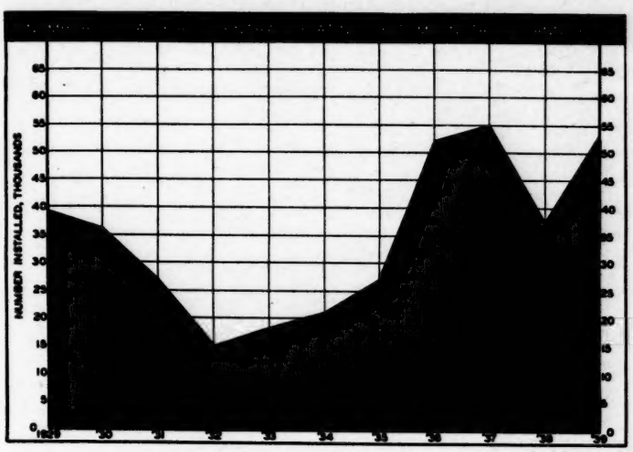
ANNUAL SALES



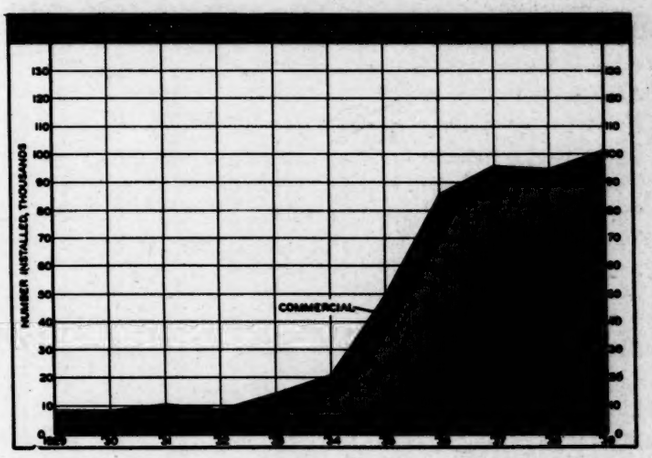
17 An estimate of the number of automatic heating installations made annually since 1929, including oil burners, central gas systems, and stokers.



18 The trend of oil burner installations during recent years. The conversion burner figures do not include industrial type burners. Figures do not include exports.



19 An estimate of the number of gas heating units installed by years. Space heaters are not included, since the chart covers only central systems.



20 An estimate of the number of stokers installed annually. Industrial type stokers used for power generation are not included.

An early publication relating to this research program indicates that an upper cost limit of $400 for a family of four is set on heating plants which are considered as falling in the scope of this project. In order to carry out studies a small one-story, frame dwelling has been erected at the Bureau. This test house is about 25 ft. x 26 ft.-6 in. in rectangular plan, contains four rooms and bath, has eight windows, basement and attic under a pitched roof covered with asphalt shingles. Its construction is similar to that commonly found in small houses of comparable size except insofar as special test features have been incorporated. Among these are a movable ceiling which can be adjusted as desired to give room heights from 7 ft. to 9 ft.; a three-flue chimney; a large fire-place so constructed that fire-places of smaller dimensions can be secured by adding additional brick; and arrangements whereby circulating type fire-places can be placed in the fireplace opening. Generally the building is intended to be flexible enough to permit testing under a variety of conditions while still getting results of a practical nature. At the year-end no published results from this house were at hand.

Among the privately conducted projects connected with low cost housing and which attracted attention during the year were (a) the Housing Conference at Yale University held late in January, and (b) the equipping of several private test houses wherein low cost methods are to be studied. In several instances attention has been given to attempts to make use of floor heating or side wall heating independently of the older heating methods or as adjuncts to them. Interesting in this connection also is the fact that the organized manufacturers of room circulating stoves made moves looking toward the application of their equipment on a more nearly rational basis and the resulting promise of some technical attention to the application of this kind of equipment to small low cost residence construction.

So far as central heating for detached, small, low-cost residences is concerned, what may be regarded as the most recent specialized equipment for accomplishing this by the use of a hot water system was described in HEATING & VENTILATING, in the April, 1939 issue on page 28. This equipment is a distinct innovation and

WINTER EQUIPMENT SALES STATISTICS

1 Cast Iron Square Boilers
Shipments, Thousand Pounds

	1936	1937	1938	1939
Jan	13,786	13,616	10,852	12,276
Feb	11,955	11,306	8,417	9,246
Mar	8,984	13,947	9,209	10,406
Apr	11,129	14,345	10,557	9,448
May	13,552	12,710	12,798	17,744
Jun	19,523	15,252	14,123	14,557
Jul	29,200	17,471	17,841	16,807
Aug	24,658	25,149	17,804	25,360
Sep	33,549	40,915	30,852	35,593
Oct	45,960	39,539	34,108	—
Nov	28,642	20,459	20,027	—
Dec	19,765	16,036	15,081	—
YR	260,703	240,745	201,669	—

2 Cast Iron Round Boilers
Shipments, Thousand Pounds

	1936	1937	1938	1939
Jan	3,120	2,244	1,422	1,642
Feb	2,437	1,897	1,215	1,376
Mar	1,664	2,131	1,131	1,113
Apr	1,683	1,808	1,181	1,203
May	2,243	1,622	1,297	1,051
Jun	3,193	2,130	1,400	1,427
Jul	3,905	2,325	2,015	1,749
Aug	3,634	3,386	2,287	2,537
Sep	5,809	5,807	4,078	4,634
Oct	8,633	5,898	4,803	—
Nov	5,202	2,916	3,083	—
Dec	3,562	2,158	2,182	—
YR	45,085	34,322	26,034	—

3 Steel Heating Boilers
New Orders, No. of Units

	1936	1937	1938	1939
Jan	444	422	336	966
Feb	453	437	278	639
Mar	347	843	364	384
Apr	373	439	391	562
May	416	441	446	661
Jun	639	535	641	785
Jul	758	856	643	744
Aug	783	1,075	797	891
Sep	913	760	904	862
Oct	844	616	849	—
Nov	539	375	708	—
Dec	434	372	724	—
YR	6,943	7,171	7,081	—

4 Steel Heating Boilers
New Orders, Sq. Ft. Heat. Surf.

	1936	1937	1938	1939
Jan	214,719	180,160	135,023	437,985
Feb	209,172	204,830	127,095	298,739
Mar	156,130	400,179	139,913	120,248
Apr	162,279	184,420	171,831	198,661
May	182,593	188,079	206,305	224,625
Jun	312,718	200,795	220,043	267,804
Jul	343,698	346,471	227,884	289,673
Aug	313,895	427,076	254,244	334,649
Sep	302,925	249,299	288,120	437,998
Oct	285,138	202,411	273,368	—
Nov	187,695	122,452	247,746	—
Dec	157,883	152,785	279,087	—
YR	2,828,845	2,858,957	2,570,659	—

5 Mechanical Draft Oil Burners
Shipments in U.S., No. of Units

	1936	1937	1938	1939
Jan	5,511	6,600	4,546	6,429
Feb	5,515	6,870	3,888	5,732
Mar	6,883	11,021	6,037	8,307
Apr	7,788	11,467	5,324	7,766
May	9,850	10,833	6,419	11,109
Jun	11,387	10,876	7,055	12,974
Jul	14,138	12,456	8,167	13,213
Aug	17,347	17,747	11,874	18,671
Sep	29,770	28,142	21,500	28,248
Oct	28,236	19,817	16,690	—
Nov	12,756	7,804	8,293	—
Dec	8,232	6,023	6,566	—
YR	157,413	149,656	106,359	—

6 Boiler-Oil Burner Units†
Shipments in U.S., No. of Units

	1936	1937	1938	1939
Jan	411	599	319	556
Feb	361	675	314	482
Mar	515	757	403	556
Apr	592	857	487	694
May	780	1,177	676	1,018
Jun	1,416	1,037	758	1,288
Jul	1,237	1,227	759	1,392
Aug	1,557	1,384	1,227	2,266
Sep	2,332	2,120	2,042	3,427
Oct	2,298	1,874	1,699	—
Nov	1,034	723	909	—
Dec	706	400	593	—
YR	13,239	12,830	10,186	—

†Boilers and burners sold integrally; cast iron and steel

7 Furnace-Oil Burner Units†
Shipments in U.S., No. of Units

	1936	1937	1938	1939
Jan	221	463	313	679
Feb	230	523	271	481
Mar	223	755	340	669
Apr	344	660	468	722
May	286	782	471	1,089
Jun	545	874	651	1,219
Jul	560	936	759	1,282
Aug	776	1,316	949	1,801
Sep	1,050	1,430	1,402	2,019
Oct	1,130	1,315	1,225	—
Nov	846	669	912	—
Dec	619	433	690	—
YR	6,830	10,156	8,451	—

†Furnaces and burners sold integrally; cast iron and steel

8 Total Oil Burner Sales†
Shipments in U.S., No. of Units

	1936	1937	1938	1939
Jan	6,239	7,730	5,208	7,704
Feb	6,145	8,117	4,498	6,740
Mar	7,653	12,589	6,804	9,560
Apr	8,748	13,058	6,302	9,266
May	10,948	12,845	7,600	13,298
Jun	13,400	12,805	8,494	15,499
Jul	15,989	14,648	9,720	15,941
Aug	19,775	20,492	14,114	22,790
Sep	33,295	31,800	25,017	33,714
Oct	31,853	23,176	19,709	—
Nov	14,796	9,284	10,189	—
Dec	9,634	6,903	7,915	—
YR	178,475	173,433	125,570	—

†Total of Tables 5, 6, and 7 plus sales of natural draft burners.

9 Indirect Conditioners†
Orders, Dollars

	1936	1937	1938	1939
Jan				16,188
Feb				10,781
Mar				20,393
Apr				8,307
May				19,377
Jun		No Data		19,881
Jul				17,440
Aug				5,800
Sep				19,793
Oct				—
Nov				—
Dec				—
YR				—

†For use with steam or hot water systems

10 Residential Stokers
Sales, No. of Units

	1936	1937	1938	1939
Jan	2,114	2,494	1,955	2,921
Feb	2,442	2,685	2,103	1,995
Mar	2,473	4,912	3,393	3,136
Apr	3,006	5,347	3,273	3,006
May	3,589	6,096	4,437	4,574
Jun	4,342	7,813	5,365	6,798
Jul	5,488	6,452	8,075	8,386
Aug	8,433	11,590	11,380	13,137
Sep	15,061	16,608	18,330	18,105
Oct	16,584	14,492	15,728	—
Nov	7,857	5,292	6,643	—
Dec	4,897	3,670	3,947	—
YR	76,286	87,451	84,629	—

11 Small Commercial Stokers
Sales, No. of Units

	1936	1937	1938	1939
Jan	189	198	203	267
Feb	167	199	171	187
Mar	138	236	237	293
Apr	130	307	148	220
May	124	279	195	249
Jun	202	380	271	442
Jul	316	405	379	447
Aug	492	760	602	835
Sep	808	1,228	950	1,093
Oct	1,022	1,181	890	—
Nov	529	514	608	—
Dec	431	381	407	—
YR	4,548	6,068	5,061	—

12 Large Commercial Stokers
Sales, No. of Units

	1936	1937	1938	1939
Jan	84	185	161	210
Feb	71	228	116	193
Mar	41	167	146	240
Apr	44	202	101	201
May	60	205	199	200
Jun	78	289	258	359
Jul	148	392	371	413
Aug	198	657	573	710
Sep	270	933	846	761
Oct	303	920	721	—
Nov	301	473	438	—
Dec	185	351	398	—
YR	1,783	5,002	4,328	—

sufficient time has not yet elapsed to correctly evaluate its performance.

In at least one low cost development a similarly distinctive piece of equipment for use with circulating warm air was also announced during the year. It also is so new that sufficient time has not elapsed to permit evaluation.

While the year thus produced a great deal of interest in the whole problem of satisfactorily heating low-cost housing and while some distinctive equipment was developed and applied, it is obvious that the whole subject should be regarded as being in process of passing through a study, test, and development period with the end not yet in sight.

Developments in Apartment House Heating

It is estimated that upward of 25% of the residence units built in 1939 were of the multi-family or apartment type. Of this total a considerable part was of the low-cost variety and the heating was of the kind mentioned in preceding paragraphs. The remainder consisted of apartment houses built to meet the needs of families able to pay the necessary rentals and were generally built by private funds. The methods used to heat them were undoubtedly affected by the prevalence of low-cost apartment construction but there was more leeway for refinements in method and equipment. In the July issue of HEATING & VENTILATING numerous instances of recent practice in this kind of building were outlined.

Warm Air Heating Practices

Warm air heating was the most popular form used in residence construction. To all intents and purposes furnace designs now appear so stable that there is little reason to expect major shifts or any trend departures in design in the immediate future. A definite attempt has been made to standardize on duct sizes and register sizes and undoubtedly the results of such efforts will result in reduced storage of parts and in reduced costs for duct installations. Such matters as register locations, air quantities, and air velocities have been codified, and the coded rules are gaining in acceptance.

Good practice now demands the use of warm air registers in each room, cold air returns from all the main rooms, the use of two-way deflecting type registers, the use of low resistance fittings, and the use of suitable types of control. The elimination of unhealthy trade practice is a paramount issue.

The hot water supply problem continues to be an important one where warm air heating is used in residences. Fuelbox coils, water-jacketed sections in the furnace or separately fired heaters for hot water continue as the only available methods in many localities. Once the warm air furnace goes out of use in the summer months, the choice of method is frequently confined to a separately fired water heater only.

A method which in time may be of some importance in connection with this problem is that of extracting heat from the sun to warm water in summer. It has only begun to attract serious attention and installations have been reported in a few localities. Commercial equipment is offered for sale in some cities. Possibilities of this method are undergoing studies and additional information on this is presented elsewhere in this issue.

To an even greater extent than in the past, automatically fired furnaces of from 50,000 B.t.u. to 100,000 B.t.u. capacity of compact design appeared on the market during 1939.

In the way of fan operation, there is a definite trend towards more continuous fan operation by means of the two-speed fan. Units of this type have proven most satisfactory in large rambling houses of many exposures.

Methods of securing wide variations in fan speed are under study as are also methods of varying the fan speed as a function of change in temperature of the air delivered at furnace bonnets. Simple and low-cost equipment for such purposes may bring about important changes in practice.

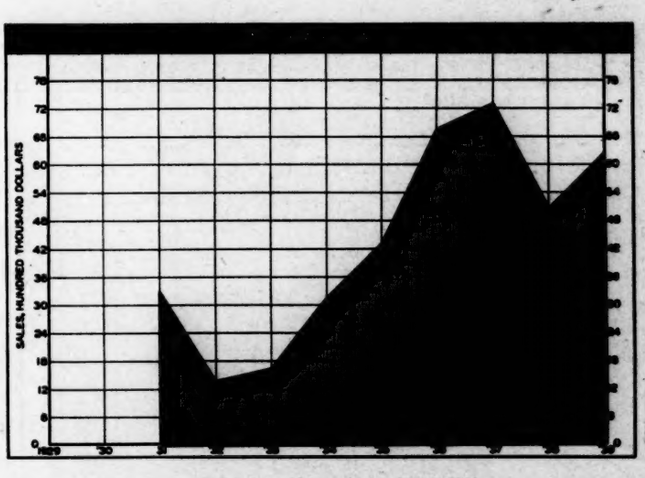
As has been the case for the past 21 years the research at the University of Illinois under the auspices of the National Warm Air Heating and Air Conditioning Association continued to supply technical findings on the subject. Results of additional tests made in the research residence when an underfeed coal stoker was used, were reported at the Chicago meeting of the Association in June (results summarized in HEATING & VENTILATING, July, 1939 issue).

A volume entitled "Winter Air Conditioning—Forced Air Heating" by Professor S. Konzo has been published by the Association and the University and contains the research results of many years as well as supplementary material from other sources. It has been prepared particularly for the installer and attempts to substitute facts for fancy, whenever possible.

The publicity campaign of the Association has completed a successful year and plans to continue the campaign are being made.

Heat from Sun Energy

That heat from the sun can be employed for both heating service hot water and for heating systems in buildings has long been so evident that here and there



21 The sales of the so-called industrial type unit heaters which are also widely used in commercial buildings as well as in factories. The chart above includes only steam and water type; figures for gas unit heaters are shown in Table 13 for 1939 only.

sun-harnessing methods have been worked out. Sun heaters located on the roof under glass panels have come into considerable vogue in some sunny localities in recent years. For example, it is reported that there are over 25,000 of these heaters used to heat domestic hot water for residences in the vicinity of Miami. Likewise there have been reports of similar equipment for heating small houses.

It should be kept in mind that if sun heat could be advantageously used to warm the domestic hot water especially during the non-heating months, then one of the problems usually found in connection with residence heating would be considerably affected. The effects on the fuel situation of a successful method of storing sun energy for residence heating purposes can be readily appreciated.

Because of these angles the announcement late in the year that a small test house was being completed at Massachusetts Institute of Technology in which to study problems of harnessing sun heat attracted much attention.

The test house is a small building for study purposes only. It is intended to furnish a place where heat can be gathered, stored, and used and where the heat quantities involved can be measured at will. From the resulting test data it is anticipated that working conclusions can be drawn. The house is reported to contain a large insulated metal storage tank for storing the heated water and the heating of the building is to be accomplished by a forced air system arranged so that the air passes over the hot surface of the storage tank in order to pick up the necessary heat on the way to the rooms to be heated. Similarly it is anticipated that air can be cooled by passing it over a surface kept cold by sun heat utilized through the absorption cycle of refrigeration.

The project is part of a larger study made possible by the gift of nearly $650,000 to M.I.T. by Dr. Godfrey L. Cabot of Boston. This fund, known as the Solar Energy Fund, is expected to yield income which is to be used to study methods of converting the sun's radiant energy into useful power or for storing such energy for future use.

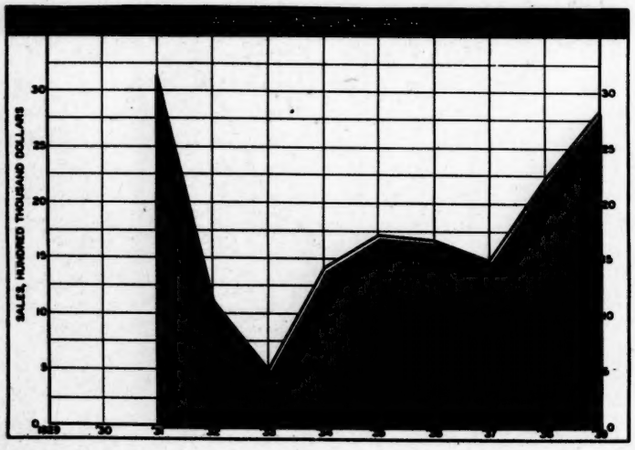
Construction of the small test house is the initial step in the whole project which is also ultimately expected to cover such phases of sun energy as the effect of this energy on certain photo-chemical, photo-electric, and thermo-electric phenomena. Basic research studies of this kind suggest the possibility of eventually discovering or developing substances that can absorb sun energy which can later be used economically for power production.

Steam Heating in 1939

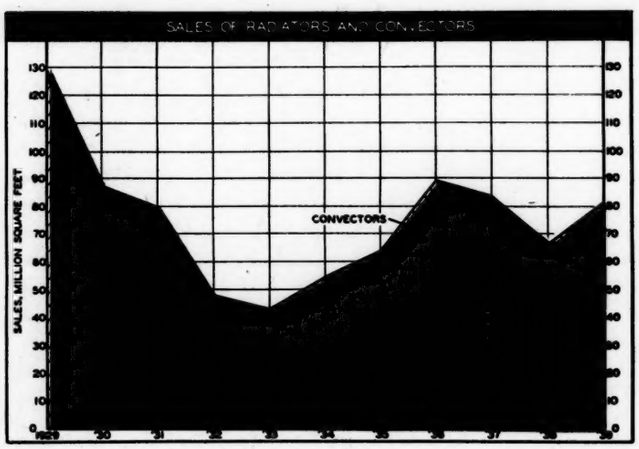
There were very few announcements of new equipment for use in connection with steam heating systems during the year. Some equipment manufacturers announced improvements and redesigns of existing equipment but very little appeared which could be called a real departure from former designs. This continued a situation which has existed for the past several years during which there has been what approaches a standstill in the development of steam heating methods.

The period has been characterized by definite challenges to the use of steam on the part of hot water and air conditioning. Warm air heating methods have become widely popular in residences while here and there use of air has been chosen to the exclusion of steam in larger buildings. Rising popularity of forced hot water has also affected the supremacy of steam heating in medium sized buildings. Generally, steam heating continues to exercise its supremacy in large buildings and in large groups of buildings. Actual volume of sales of equipment continued to come in considerable measure from repair, replacement and maintenance of systems already installed.

Also, as in former years, attention continued to be centered on automatic control incorporated into the steam system itself. Virtually every maker of a sufficiently broad line of steam heating accessories to warrant the use of the word *system* in connection with its application, also offers on the market suitable control devices. Taking account of the rising popularity of forced hot water systems some manufacturers who formerly confined their attention wholly to the use of steam have either already brought forth hot water sys-



22 Sales of unit ventilators primarily used for heating and ventilating school buildings. The sales are in terms of new orders and do not represent installed cost. Data are not available prior to 1931.



23 Sales in equivalent square feet of convectors and direct cast iron radiators. The convector figures include cast iron convectors as well as non-ferrous types. Figures on convectors prior to 1931 are estimated.

tems of their own or are known to be considering such a step. It is anticipated that adoption of rating standards for steam boilers may eventually serve to offset some of the recent popularity of warm air methods in residential construction.

Hot Water Heating in 1939

As in the past several years the use of pumps or forced circulation for hot water heating continued to increase in popularity. It is stated by some manufacturers that they believe that the use of pumps or circulators is now virtually a standard practice among heating contractors to the extent that it is their belief that very few, if any, gravity hot water heating systems are now being installed except possibly in a few smaller towns and cities.

Along with a much greater tendency toward the use of zoning goes an apparent swing toward the use of one-main systems. Some reports indicate that single-main installations were used in as many as 50% of the hot water jobs installed during 1939. Zoning has become so common that none but the very smallest installations are put in as a single zone. Along with the increased use of zoning has come the development of a number of new controls and new control hook-ups with outside temperature as the basis of control.

Particularly interesting are reports that hot water heating installations during the year continued to find their way into larger and larger buildings and building projects. A number of the large group projects of U. S. Housing Authority are heated by forced hot water as are also a number of privately constructed apartment house groups in a number of the larger cities. Reports also have it that use of high temperature water continued to find increasing favor especially in the East where the practice has not found any general acceptance heretofore. Sizing of radiators on a basis of 200F mean surface temperature is reported to be generally common practice. Use of pipe sizes much smaller than those commonly found necessary with gravity hot water systems continues, with nothing to indicate but that this fairly recent innovation in pipe sizing practice is working out satisfactorily.

Statistical Position

Highlighted in the statistical picture of 1939 business in winter equipment is the fact that substantial gains were made by the majority of items for which figures are available. HEATING & VENTILATING's Index of Heating Business Activity which summarizes the story into one figure indicates that, after correcting for seasonal variation, heating business in 1939 was at 78.3% of 1929 levels as compared with 61.4% during 1938. The 1939 figure is, however, based on 9 and 10 months' figures, and it is quite possible that records for the closing months of the year may substantially increase the 1939 level.

Figures on sales for 9 and 10 months of 1939 as compared with the corresponding periods for 1938 have been condensed and shown in Tables I and II. Outstanding among the gains reported are those in non-ferrous convectors, oil burning equipment, gas burning equipment, and steel heating boilers. The only equipment which suffered in comparison of 1939 sales with the preceding year was domestic anthracite stokers.

The dollar value of sales of non-ferrous convectors increased approximately 75% in 1939 while the sales in square feet rose nearly 90%, indicating a still further drop in the unit price. This drop was not so marked in the case of cast iron convectors which increased 23% in square feet sales and 20% in dollar value. It is interesting to note that convectors of all types continue their inroads on the direct cast iron radiator. Sales of the latter rose 12.6% in 1939, as compared with an increase of 51.8% in sales of all types of convectors—both in terms of square feet. The comparison is indicated graphically in Chart 23.

The coal-fired boiler business is split up among sectional, round and steel boilers; similarly the warm air furnace business is divided between steel and cast iron furnaces. Production and sales on cast iron boilers are reported in terms of pounds, and sales figures on furnaces are not available in terms of number of units. A comparison between the progress of radiator heating and warm air heating is thus difficult, except in the case of integral units designed for oil and gas. This comparison is shown in Table III.

This table shows that, over the period covered, furnaces have shown more consistent increases than boilers. On the other hand, the current increase in oil-burner sales is quite sharp.

TABLE I—TREND OF FUEL-BURNING EQUIPMENT SALES—1939 vs. 1938

(BASED ON 9 OR 10-MONTH SALES)

Cast-iron sectional boilers	+ 14.3%
Cast-iron round boilers	+ 4.4
Steel heating boilers (no.)	+ 35.3
Steel heating boilers (htg. surf.)	+ 47.5
Boiler-oil burner units	+ 67.1
Warm air furnaces (est'd.)	+ 15.0
Furnace oil-burner units	+ 77.0
Mechanical draft oil burners	+ 50.3
Residential anthracite stokers	— 14.7
Residential soft coal stokers	+ 9.4
Gas-burning equipment	+ 41.1

TABLE II—TREND OF HEAT DISTRIBUTION EQUIPMENT SALES—1939 vs. 1938

(BASED ON 9 OR 10-MONTH SALES)

Steam and water type unit heaters	+ 23.6%
Unit ventilators	+ 28.2
Non-ferrous convectors (sq. ft.)	+ 89.6
Cast-iron convectors (sq. ft.)	+ 23.0
Cast-iron radiators	+ 12.6

TABLE III—OIL AND GAS BOILER AND FURNACE SALES INCREASES

	INCREASE IN SALES OVER PRECEDING YEAR			
TYPE OF UNIT	1939	1938	1937	1936
Oil boiler-burner units	+ 67%	— 27%	— 4%	+ 42%
Gas designed boilers	+ 8%	— 38%	0%	+ 73%
Oil furnace-burner units	+ 77%	— 28%	+ 50%	+ 142%
Gas designed furnaces	+ 62%	0%	+ 67%	+ 140%

WINTER EQUIPMENT SALES STATISTICS

13 Gas-Fired Unit Heaters
Orders, Dollars

	1936	1937	1938	1939
Jan				74,282
Feb				6,968
Mar				7,278
Apr				8,878
May				26,291
Jun		No Data		35,911
Jul				57,226
Aug				92,597
Sep				93,219
Oct				—
Nov				—
Dec				—
Yr				—

14 Steam-Type Unit Heaters
Orders, Dollars

	1936	1937	1938	1939
Jan	402,091	494,053	412,164	375,439
Feb	367,197	372,864	281,303	286,489
Mar	263,040	496,799	288,555	552,441
Apr	210,881	429,078	192,505	255,309
May	232,695	439,431	195,887	247,339
Jun	298,643	611,053	257,852	329,176
Jul	480,989	376,925	253,572	319,290
Aug	569,605	573,152	398,709	439,583
Sep	773,205	895,580	598,441	754,719
Oct	1,359,652	1,131,419	795,367	—
Nov	990,487	773,453	749,930	—
Dec	815,148	702,234	635,603	—
Yr	6,763,633	7,296,079	5,059,888	—

15 Unit Ventilators
Orders, Dollars

	1936	1937	1938	1939
Jan	202,503	122,057	135,261	296,656
Feb	216,401	119,719	219,565	253,211
Mar	130,570	197,210	189,858	187,532
Apr	190,302	77,465	176,086	248,057
May	196,048	78,492	118,099	127,304
Jun	168,572	89,388	109,935	91,117
Jul	123,926	212,752	67,812	116,358
Aug	133,389	170,969	64,426	109,926
Sep	62,645	64,523	104,723	90,651
Oct	96,381	87,953	290,571	—
Nov	62,077	110,549	343,270	—
Dec	92,299	143,747	390,935	—
Yr	1,675,113	1,474,824	2,210,541	—

16 Cast Iron Radiators
Shipments, 1000 Sq. Ft.

	1936	1937	1938	1939
Jan	4,183	4,572	3,320	3,814
Feb	3,086	3,613	2,571	2,950
Mar	2,720	4,343	2,715	2,887
Apr	3,549	4,624	3,692	3,103
May	4,175	4,416	5,008	4,207
Jun	5,590	5,360	4,423	4,730
Jul	8,027	5,543	5,219	5,280
Aug	7,785	7,178	5,214	7,234
Sep	9,190	9,122	6,387	9,209
Oct	12,452	9,550	7,679	—
Nov	9,475	6,671	5,697	—
Dec	7,444	5,119	4,815	—
Yr	77,676	70,111	56,740	—

17 Non-Ferrous Convectors
Elements Only, Sq. Ft.

	1936	1937	1938	1939
Jan	145,028	34,360	21,707	36,747
Feb	61,682	21,669	18,298	25,823
Mar	62,856	18,398	25,080	47,203
Apr	51,085	41,161	25,904	61,565
May	74,301	83,867	51,520	100,797
Jun	84,395	40,803	45,847	138,001
Jul	100,984	41,192	71,532	124,693
Aug	139,583	89,992	60,010	67,652
Sep	105,887	90,073	64,678	104,856
Oct	141,406	63,977	57,963	80,321
Nov	102,927	57,554	110,310	—
Dec	168,264	35,003	109,192	—
Yr	1,238,398	618,049	662,041	—

18 Non-Ferrous Convectors
Elements Only, Dollars

	1936	1937	1938	1939
Jan	12,794	5,804	3,817	5,813
Feb	8,270	3,651	3,148	3,721
Mar	9,089	2,835	4,247	7,494
Apr	9,516	5,949	4,318	9,800
May	17,440	12,469	7,822	16,484
Jun	13,713	6,368	8,124	21,433
Jul	16,757	7,190	10,832	19,670
Aug	24,219	16,244	9,194	12,769
Sep	19,408	15,178	10,347	14,924
Oct	25,770	10,591	9,006	13,241
Nov	18,089	10,226	18,063	—
Dec	28,043	5,878	14,641	—
Yr	203,108	102,383	103,559	—

19 Non-Ferrous Convectors
Sold Complete, Sq. Ft.

	1936	1937	1938	1939
Jan	136,021	355,662	199,308	409,674
Feb	121,133	247,326	173,499	418,180
Mar	117,400	463,101	256,476	496,700
Apr	202,015	427,785	258,817	545,833
May	233,101	367,478	309,365	717,256
Jun	348,855	461,121	342,659	814,204
Jul	440,717	361,243	417,401	657,196
Aug	414,785	423,825	565,268	786,563
Sep	447,562	483,642	494,991	985,535
Oct	459,167	483,546	493,525	891,479
Nov	425,617	411,327	569,578	—
Dec	328,497	251,338	491,435	—
Yr	3,674,870	4,737,394	4,572,322	—

20 Non-Ferrous Convectors
Sold Complete, Dollars

	1936	1937	1938	1939
Jan	52,848	101,249	69,374	122,173
Feb	41,189	77,988	55,364	122,413
Mar	39,998	142,114	90,197	158,774
Apr	67,569	149,741	89,620	160,439
May	78,870	133,450	101,433	215,703
Jun	115,807	148,996	113,115	236,267
Jul	148,408	119,607	126,308	190,228
Aug	136,911	138,698	171,205	223,347
Sep	134,277	156,434	149,620	278,690
Oct	141,883	154,047	156,840	256,972
Nov	136,271	133,243	167,778	—
Dec	97,277	81,087	149,525	—
Yr	1,190,308	1,536,654	1,440,379	—

21 Non-Ferrous Convectors
Sq. Ft., Total Tables 17 and 19

	1936	1937	1938	1939
Jan	281,049	390,022	221,015	446,421
Feb	182,815	268,995	191,797	444,003
Mar	180,256	481,499	281,556	543,903
Apr	253,100	468,946	284,721	607,398
May	307,402	451,345	360,885	818,053
Jun	433,250	501,924	388,506	952,205
Jul	541,701	402,435	488,933	781,889
Aug	554,368	513,817	625,278	854,215
Sep	553,449	573,715	559,669	1,090,391
Oct	600,573	547,523	551,488	971,800
Nov	528,544	468,881	679,888	—
Dec	496,761	286,341	600,627	—
Yr	4,913,268	5,355,443	5,234,363	—

22 Cast Iron Convectors
Sales, Sq. Ft.

	1936	1937	1938	1939
Jan	292,724	427,185	438,680	442,313
Feb	223,077	478,057	285,037	305,284
Mar	229,324	464,734	325,966	339,654
Apr	277,678	554,418	408,756	476,039
May	550,513	612,516	619,049	555,672
Jun	612,618	640,202	603,669	728,600
Jul	802,851	854,667	656,438	810,703
Aug	754,954	1,081,867	703,247	1,105,658
Sep	749,825	981,951	605,664	914,616
Oct	789,218	648,536	614,038	791,973
Nov	655,942	541,019	607,810	—
Dec	632,972	477,653	498,480	—
Yr	6,571,696	7,762,805	6,366,834	—

23 Cast Iron Convectors
Sales, Dollars

	1936	1937	1938	1939
Jan	80,338	136,687	140,929	138,675
Feb	66,424	145,021	93,598	101,246
Mar	66,007	153,103	104,250	112,131
Apr	'84,322	174,545	135,565	139,170
May	155,386	189,630	193,892	185,138
Jun	172,507	211,588	190,319	223,538
Jul	231,595	252,562	193,918	230,991
Aug	229,235	324,857	213,989	324,370
Sep	219,557	285,863	198,304	284,553
Oct	244,444	201,146	197,177	253,231
Nov	190,613	181,605	203,284	—
Dec	184,386	150,869	174,679	—
Yr	1,924,814	2,407,446	2,039,904	—

24 Convectors, All Types
Total, Tables 21-22, 1000 Sq. Ft.

	1936	1937	1938	1939
Jan	574	817	660	889
Feb	406	767	477	749
Mar	410	946	608	889
Apr	531	1,023	693	1,083
May	858	1,064	980	1,374
Jun	1,046	1,142	992	1,681
Jul	1,345	1,257	1,145	1,593
Aug	1,309	1,596	1,329	1,960
Sep	1,303	1,556	1,165	2,005
Oct	1,390	1,196	1,166	1,764
Nov	1,184	1,010	1,288	—
Dec	1,130	764	1,099	—
Yr	11,485	13,118	11,601	—

WINTER EQUIPMENT SALES STATISTICS

25 Humidifiers, Separate†
Orders, Dollars

	1936	1937	1938	1939
Jan				6,766
Feb				2,492
Mar				6,852
Apr				2,313
May				1,224
Jun		No Data		908
Jul				2,081
Aug				1,646
Sep				3,165
Oct				—
Nov				—
Dec				—
YR				—

†Individual units for comfort use

26 Humidifiers, in Combination†
Orders, Dollars

	1936	1937	1938	1939
Jan				25,785
Feb				16,080
Mar				17,343
Apr				19,034
May				18,592
Jun		No Data		25,207
Jul				26,311
Aug				36,733
Sep				50,596
Oct				—
Nov				—
Dec				—
YR				—

†Comfort type for use with conditioning apparatus

27 Humidifiers, Industrial†
Orders, Dollars

	1936	1937	1938	1939
Jan				49,562
Feb				67,066
Mar				59,894
Apr				87,373
May				52,377
Jun		No Data		66,471
Jul				49,831
Aug				48,590
Sep				59,107
Oct				—
Nov				—
Dec				—
YR				—

†For use in industrial applications

28 Furnaces Sold Separately†
Orders, Dollars

	1936	1937	1938	1939
Jan				238,477
Feb				259,716
Mar				541,193
Apr				562,449
May				632,742
Jun		No Data		1,123,886
Jul				1,106,201
Aug				1,726,244
Sep				2,646,742
Oct				—
Nov				—
Dec				—
YR				—

†Warm air furnaces sold separately for gravity or forced jobs

29 Furnace-Blower-Filter Units†
Orders, Dollars

	1936	1937	1938	1939
Jan				383,486
Feb				306,572
Mar				503,297
Apr				572,922
May				720,311
Jun		No Data		801,279
Jul				765,359
Aug				1,098,051
Sep				1,303,654
Oct				—
Nov				—
Dec				—
YR				—

†Complete forced air units, incl. furnace, filter or washer, and blower

30 Blower-Filter Units†
Orders

	1936	1937	1938	1939
Jan				19,427
Feb				21,114
Mar				40,628
Apr				16,567
May				35,557
Jun		No Data		31,076
Jul				29,149
Aug				50,546
Sep				64,504
Oct				—
Nov				—
Dec				—
YR				—

†Circulating units for winter use in connection with warm air furnaces

District Heating in 1939

By JOHN C. COLLINS, Jr.
Sec. Treas. National District Heating Association

To help its member companies decrease the cost of generating, distributing and servicing steam, and their customers more effectively to use the heat in the product, is the essence of the long range program of the National District Heating Association. Statistics indicate progress is being made especially in economical utilization.

In spite of decreased sales, which, however, were a direct reflection of warmer weather, decreased occupancy of heated space and to some extent, greater economy of use; high utility officials at the summer meeting spoke optimistically.

Recent increased manufacturing activity has led to an increase in industrial steam sales. More thought is being given to the sale of district steam for cooling and dehumidification work.

The Association Headquarters are now equipped to provide its members with an information service which it is felt will be useful and attractive.

Heating with Anthracite in 1939

By ALLEN J. JOHNSON
Director, Anthracite Industries Laboratory, Primos, Pennsylvania

A number of factors combined to materially improve the sale of anthracite during 1939. With the year's production running nearly five million tons or 13% ahead of last year, several operators reported as early as November that their sales for the partial year of 1939 had already exceeded the total of 1938.

This advance served to further augment the interest of leading manufacturers in the production of anthracite equipment. As a result, the number of nationally prominent manufacturers and distributors who announced the addition of anthracite equipment to their lines for the first time in 1939, was most encouraging and is considered a significant step in connection

not only with making anthracite's gains permanent ones, but also of expanding them even further in the future.

Outstanding developments in this direction included the announcement of a very novel low-priced overfed stoker as produced by one of the largest plants of its type in the country. A leading stoker manufacturer added a moving grate commercial type stoker to his line, thus further strengthening anthracite in the field of utilization just above domestic heating where until a year or so ago, automatic anthracite heating equipment had been badly needed.

While it would be difficult to define an exact turning point, there is no question but that the domestic anthracite stoker is now a finished production device without the necessity for any cut-and-try or uncertainties whatsoever. Among the established manufacturers, this is reflected in allowing them to turn more attention to production methods and to wholesale outlets. There is every evidence that this should result in rapid increases in the popularization of anthracite burners.

The Second Annual Anthracite Conference at Lehigh University was the outstanding engineering meeting of the year. Sixteen papers were presented on subjects relating to the combustion characteristics of anthracite, the use of anthracite in various phases of domestic heating, the use of anthracite in industrial processes, merchandising, economics, mining, preparation, and the use of anthracite ash.

Mr. J. Morgan Kipe, director of Anthracite Industries' Merchandising Schools, announced that to date over two thousand representatives of fuel and equipment companies have been given basic and fundamental training in combustion and fuel service technique. This is also a significant and important technical advance as it will undoubtedly be immediately reflected in the more satisfactory, more intelligent, use of anthracite.

In general, it may be stated that 1939 was largely devoted to a consolidation and expansion of noteworthy gains in equipment manufacturing and distribution, thus paving the way to increased future popularity and success of anthracite as a fuel for heating.

Progress of Heating with Gas in 1939

By C. GEORGE SEGELER
Engineer of Utilization,
American Gas Association

The gas industry awoke with a start to the fact that no adequate information on the trend of heating in new houses had ever been prepared. Yet, this trend would be a valuable indication of popular acceptance and would show the way for effective future developments. If the information could be secured on an adequate scale, it looked valuable, consequently, a survey was undertaken in March, 1939 to investigate all the new one- and two-family houses erected during the preceding year.

The United States Department of Labor Monthly Review, January, 1939 furnished the information that: (a) 79,000 family units in multiple family buildings, (b) 138,000 one-family houses, (c) 12,500 two-family houses were erected in 2,078 cities during the year 1938.

The survey undertaken by the gas industry was directed at the one- and two-family house classification because this represented the biggest part of the 1938 building program and because the major share of the market for gas appliances lies in this field. Noteworthy cooperation from individual gas companies led to the return of reports covering 75% of the entire construction for the year; that is 101,878 houses. Complete information on what the public wants in new houses was thus made available for 102,000 buildings.

Table I shows the gas service and gas appliances as extended from the survey to all of the one- and two-family construction reported during 1938; 57.6% of the new homes selected gas heating, a total so large that the gas industry itself was pleasurably surprised.

As is to be expected, this percentage was highest where natural gas is available and, as indicated in the table, 77.8% of the new homes adopted gas heating where natural gas was available. In mixed gas territories, 42% of the new homes have adopted gas heat while in the manufactured gas areas, 10.3% installed gas heat. Certain manufactured gas markets report as high as 30% gas heating sales in new buildings but many manufactured gas centers were relatively inactive. Recognizing the need for additional promotional effort in this market, twenty manufactured gas companies introduced new lower house heating rates during the twelve months ending October, 1939.

In the multiple family dwellings, a considerable number of United States Housing Authority projects erected to rehouse slum dwellers are in construction with more to follow. More than 66 of the 162 projects, far enough along towards erection that the heating methods have been decided, will be designed for gas heating and other gas services. Gas was chosen for the fuel for many of these projects after an analysis had been made of all of the factors of cost for various methods of heating, as outlined in Bulletin No. 20 of the United States Housing Authority.

J. E. West† of the Washington Gas Light Company reported on the culmination of several years' development in the redesign of the old-fashioned flat. Long in disrepute among speculative builders, largely because of heating difficulties, Washington has led the way to show the advantages to both builder and home owner in a small multi-family flat with each individual tenant in charge of his own heating plant in his own apartment. Three thousand of these dwelling units have been constructed for all-gas operation with heating costs running between $40 and $50 per year.

TABLE I—SUMMARY OF GAS SERVICE AND GAS APPLIANCES

Gas	No. of New Homes	House Heating	Percent	Water Heating	Percent	Cooking	Percent
Natural	100,900	78,600	77.8	90,000	88.9	91,200	90.2
Mixed	10,700	4,510	42.1	8,400	78.5	9,550	89.1
Manufactured	39,700	4,070	10.3	15,600	39.2	32,600	82.0
Totals	151,300	87,180	57.6	114,000	75.1	133,350	88.0

†A Made-to-Order Market for Gas House Heating—*A.G.A. Monthly*, December, 1938.

TABLE II.—SUMMARY OF CHANGE IN STATUS OF GAS-FIRED CENTRAL HOUSE-HEATING INSTALLATIONS FROM JULY 1, 1938 TO JULY 1, 1939

	No. Reported as of July 1, 1939	Increase From July 1, 1938	
		No.	%
Total Customers Served—	11,636,911	226,011	2.0
Gas-Fired Boiler Installations			
Gas Design	40,713	2,240	5.8
Conversion	51,471	5,470	11.9
Total	92,184	7,710	9.1
Gas-Fired Furnace Installations			
Gas Design	139,388	29,301	26.6
Conversion	78,152	7,362	10.4
Total	217,540	36,663	20.3
Total Boiler and Furnaces			
Gas Design	180,101	31,541	21.2
Conversion	129,623	12,832	11.0
Total*	309,724	44,373	16.7
Grand Total**	418,242	55,420	15.3

*Include companies giving detailed data.
**Include companies reporting totals only.

Figures as reported by Statistical Department of the American Gas Association and are for 278 utility companies including 120 natural gas companies and 158 manufactured gas companies. Figures are thus incomplete as there are 1200 gas companies in the United States.

Charts covering the present status of residential gas installations appear separately in this issue, but in Table II, the change in status between July 1, 1938 and July 1, 1939 is summarized for companies reporting to the American Gas Association. This table shows that while the total number of gas customers on the lines of reporting companies increased 2.0%, the total number of house heating installations increased 15.3%. Note that this last figure is not the sum of the breakdown given just above it because a substantial number of companies only report totals. These figures do not include commercial building or apartment house heating, and in both fields, preliminary reports indicate large increases.

A survey of the year's achievements would be incomplete without telling about the closet type of gas winter air conditioner. "More House for the Money with Gas" was made possible by placing these units in the kitchen or in a ground floor utility closet, saving considerable excavation and installation costs. There were a number of installations of low cost circulators installed in Derby and Bridgeport, Conn., Wilmington, N. C. and elsewhere in low rental homes which used 20 to 30% less gas than central heat. While the heating uniformity may have been below the standard of central heat, it was satisfactory for the type of home involved and it is expected that this method of heating will be extended rapidly in the north. It already has wide acceptance in the southwest. Other new developments include practical extension of ignition of central gas heating units; two-stage and modulating room temperature controls to insure greater economy under certain conditions of use and added comfort; and thermoelectric actuating room temperature controls which insure continued operation even in the event of electric current failure.

The growing interest in winter air conditioning led to the preparation of the now well-known Gasco Guide which sets up standards for the design of winter air conditioning systems which will furnish the utmost in comfort and convenience. Thousands of copies of this Guide are in the hands of architects, realtors, and builders who are applying the principles suggested to such an extent that a noticeable improvement in the layout of winter air conditioning systems has already been reported in a number of territories.

Further studies were undertaken in several territories indicating that the gas burned in winter air conditioning systems was somewhat less than that required by any other method of heating. Naturally, recognition of this point is giving further impetus to the sale of winter air conditioning systems. Tendencies of this kind do not show up immediately in the annual statistics of gas heating, but they are quickly felt in the field.

Heating with Bituminous Coal in 1939

By RALPH A. SHERMAN
Supervisor, Fuels Division,
Battelle Memorial Institute

Because of the prolonged shutdown of the bituminous coal mines during the wage negotiations in the spring, the production during the first six months of the year was abnormally low. Restocking and the upturn in business brought many weeks of more than ten million tons of production late in the summer and fall and by November 1st, production was some 14% over that of 1938. It is scarcely expected, however, that the production for the year will equal that of the relatively good year of 1937.

A considerable part of the sale of heating equipment during 1939 was for new homes. In this market, coal and stokers have not been gaining as they should. A survey published in the July, 1939 *Coal Age* showed that although 62% of those interviewed now use coal for heating, only 28% would choose it if they were building a new home. They rated coal well above other fuels in economy and substantially above them in evenness of heat and dependability but far below in convenience and cleanliness, which are important determining factors in the choice of a fuel for the home.

This attitude of the public toward coal and stokers shows (1) that it it is not fully informed on the progress that has been made to make coal a convenient and clean fuel, and (2) that the equipment still is lacking to give the full degree of convenience that the public requires.

Steps are being taken to fill both of these needs. The bituminous coal and the stoker industries in their respective 1939 conventions agreed to accelerate their campaigns of advertising to make the public more familiar with automatic coal burners and dustless coal and to increase their efforts to develop more fully automatic coal-burning equipment. A campaign was under

way to augment the funds at the disposal of Bituminous Coal Research, Inc. The Research Committee in laying out the program of work voted unanimously that one of the major projects should be research to aid the manufacturers of equipment in the development of stokers that will automatically dispose of the ashes while burning a wide variety of bituminous coals.

Three manufacturers brought out equipment during the year that points the trend of the near future. Two designed complete units consisting of stoker, furnace, humidifier, circulating fan and filter ready to go in as package jobs. One is designed to remove the ashes automatically when semi-bituminous coal is burned; the stoker unit has had several years of successful application as a conversion machine. The third manufacturer has a unit designed primarily as a space heater; it has the coal hopper, stoker, furnace, and air circulating fan in one campact, well-styled cabinet. Two sizes are available, the larger of which has been installed in some homes in the basement as a pipeless furnace and in a few instances has been connected to ducts.

Another manufacturer new to the heating field has introduced a new low-cost conversion unit, a roll-away, overfeed stoker, on which the installation cost is low as it is necessary to plug it in at the nearest outlet and install a thermostat to control the dampers if one is not already available. Well-designed and beautifully styled, it will particularly appeal to the renter as no changes on the furnace or boiler are required. It is obviously most suitable for coke, anthracite and free-burning fuels but it is offered for all types of coal.

The perennial problem of how much combustion space is necessary for bituminous coal fired by underfeed stokers which has caused many headaches to smoke inspectors and stoker installers received attention during the year. An experimental investigation sponsored by the Stoker Manufacturers Association, the National Coal Association, the Institute of Boiler and Radiator Manufacturers, and the Steel Heating Boiler Institute was carried on by Battelle Memorial Institute in Columbus, Cincinnati, St. Louis, and Chicago. The report, presented at the annual meeting of the Smoke Prevention Association in June, revealed that no relation was found between rate of heat liberation and smoke produced but some relation existed between setting height and smoke. The Steering Committee for the project, on which the Smoke Prevention Association is represented, is being held together for the formulation of a tentative standard of setting heights for stokers. It is expected that this tentative standard will be later checked by laboratory research.

The research of the National Warm Air Heating and Air Conditioning Association on stokers continued at the Research Residence at the University of Illinois. Late in the year, the producers of bituminous coal in Missouri and Kansas sponsored an investigation of the use of coals from those states on larger stokers of the type installed in schools. The work is being done at the University of Kansas. The illinois State Legislature voted special funds for research by the Illinois State Geological Survey toward producing a more smokeless fuel from Illinois coal. It is announced that the work will be largely directed toward the production of smokeless briquets. Funds were voted by the Pennsylvania General Assembly for research on coal contingent upon matching sums from the industry. That for bituminous coal is to be devoted to some phases of residential stoker operation at the Pennsylvania State College.

Oil Heating in 1939

By FRANK H. DEWEY
President, Oil Burner Institute

The U. S. Dept. of Commerce has compiled the figures for shipments of oil burning equipment for the first nine months of 1939 and shows a 53% improvement over shipments in the corresponding period of 1938. This is gratifying to the oil burning equipment industry. It indicates the increasing acceptance of automatic heat throughout the nation, and that the volume of oil burning equipment will keep pace with any betterment in general business conditions.

Statistics from reputable sources indicate automatic oil heat is holding its position in the competitive field of fuels, namely, oil, gas and coal.

The consensus of opinion of close observers of the construction industry is that building of homes will continue in good volume. With the momentum gained in 1939, there is every reason to expect continued good business in 1940.

Improvement in automatic oil heating continues. Home owners, of both new and old houses, in every case where they can do so are going to use automatic heat. All classes of home owners desire automatic heat. This applies to those in the lower income bracket, as well as to those in the upper income bracket.

In fact, a modern automatic heating system is a part of the American plan of living, along with other modern conveniences. So there is being built up an enormous reservoir of public desire and acceptance, ready for the contact and presentation for sales.

Through automatic oil heating and air conditioning, the family gains in comfort, health, and better living. Engineers and designers are constantly improving oil burning equipment, from the standpoint of efficiency, economy, operation and appearance.

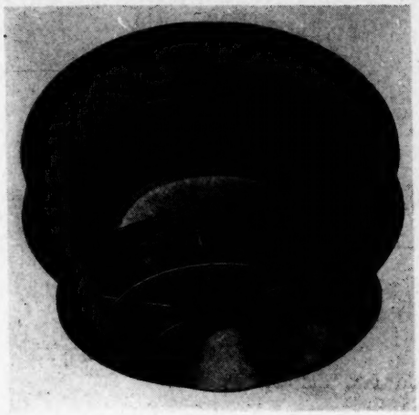
The mass field for sales still remains in the $1800 to $2400 a year income group.

Fuel oil is plentiful, widely and efficiently distributed, so owners of oil burning heating plants can use the fuel oil with confidence their requirements will always be taken care of promptly and efficiently.

There is an oil burning unit for every domestic and industrial heating requirement. New homes in increasing quantities are being equipped with automatic heating plants, existing homes are being modernized by the addition of oil heating equipment.

Dependable, efficient, automatic heating is the very essence of what makes a comfortable home, regardless of other conveniences. It is a necessity.

With these factors present, without being unduly optimistic, they do indicate that 1940 should be a good year for automatic oil heating.

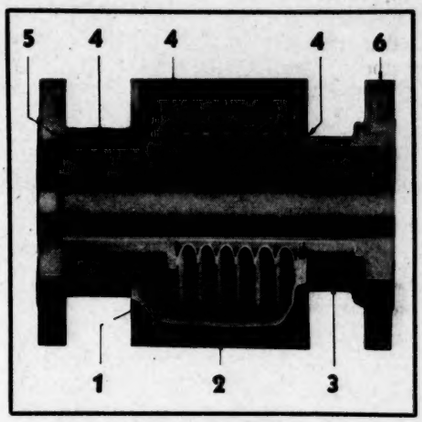


Trane Anemostat Unit Heater

NAME—Trane projection unit heater with Anemostat air distribution.
PURPOSE — For supplying and distributing heated air without drafts.
FEATURES—Anemostat air distribution unit is mounted on the outlet of the Trane projection unit heater. The manufacturer states that this results in an air stream which is draftless and blastless, and that people may sit directly under the unit in perfect comfort, even in low ceiling installations. Manufacturer claims that this device is applicable for industrial plants and textile mills where low velocity air currents which are absolutely dustless are essential to manufacturing processes.
MADE BY—*Trane Company, La Crosse, Wis.*

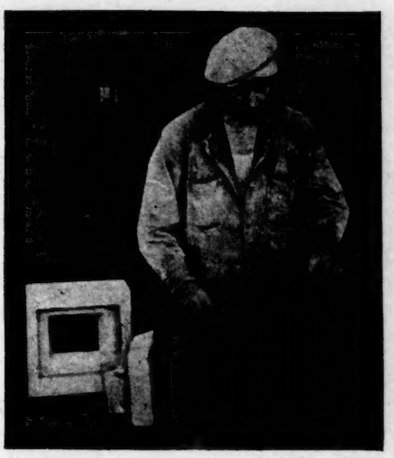
ADSCO Expansion Joint

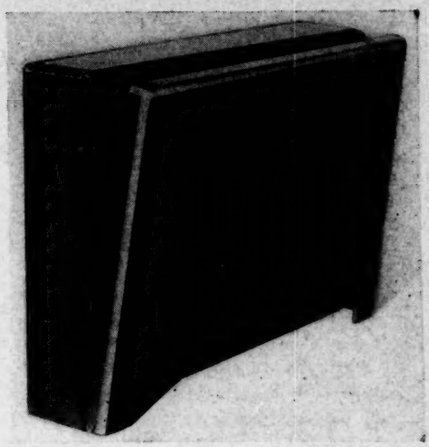
NAME — ADSCO packless expansion joint, U-ring type.
PURPOSE—A packless joint for taking up expansion on pipe lines.
FEATURES—Sectional view illustrates the essential features of the joint which has an expansion element operating on the principle of cold springing used in the installation of pipe bends. The expansion element (1) is a series of welded U-rings of corrosion resistant steel which is welded to the steel body (2) and the guide (4) on the movable sleeve (3) to form a permanent seal between the stationary body and the movable sleeve. The element is compressed axially or cold sprung one-half of the total traverse for installation in the cold line. As the line expands with the application of heat the compression in the element is relieved and it passes through the neutral position and into tension for the remaining half of the traverse. The element is fully enclosed in a steel case to prevent dirt or scale from entering and is guided at three points (4) and a limit stop (5) prevents overtravel. It is furnished with flanged ends (6) or with beveled ends for welding for pressures up to 300 lb. with traverses of 1, 2, 3, and 4 inches in single joints.
MADE BY—*American District Steam Company, North Tonawanda, N. Y.*



Johns-Manville Refractory

NAME—Light Weight Firecrete.
PURPOSE—For making special refractory shapes, for replacing difficult brick construction, for lining furnace doors, and for making small monolithic linings.
FEATURES—This refractory is said to be suitable for working temperatures up to 2200F and to be four times as effective as firebrick in retarding heat, while having only half its weight. It is also said that its resistance to spalling is such that it will withstand direct exposure to flame temperatures. Sixty-five pounds of the material are required per cubic foot of finished construction. The material can be used to form any required refractory shape simply by mixing it with water and casting it into a form. The manufacturer states that 24 hr. later the shape is ready to be placed in service.
MADE BY—*Johns-Manville Corp., New York, N. Y.*



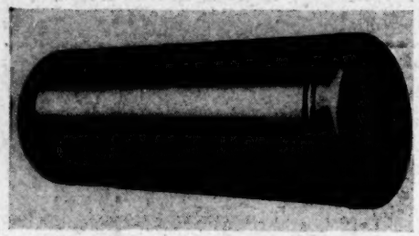


Modine Convector Enclosures

NAME—Modine standard and institutional enclosures.
PURPOSE—For enclosing the Modine standard and institutional copper convectors.
FEATURES—These enclosures have a front which can be removed without tools by simply disengaging two catches with the hands. Both kinds of convectors are available in types which may be recessed into the wall, hung on the surface of the wall or stood on the floor, flush against the wall. The institutional line has been designed to meet the requirements peculiar to institutional heating. This line includes as standard equipment such items as a lock-type removable front, lock-type dampers, heavier gages of metals and square lattice grilles. The standard convector is intended for use in department stores, offices, hotels, as well as single-family dwellings.
MADE BY—*Modine Manufacturing Co., Racine, Wis.*

Thrush One-Pipe Fittings

NAME—Thrush one-pipe fittings.
PURPOSE—A one-pipe fitting or supply tee designed particularly for one-pipe hot water heating systems.
FEATURES—The manufacturer states that these fittings are convenient to install and offer the advantage of minimum cost on highly competitive work. The fittings have an interior baffle which is designed to insure positive diversion of part of the water from a single-pipe main to provide the proper supply to the radiator. Fittings are made in either bronze or iron.
SIZES—Main sizes from ¾ to 1½ in. with ½-in. outlets.
MADE BY—*H. A. Thrush & Co., Peru, Ind.*

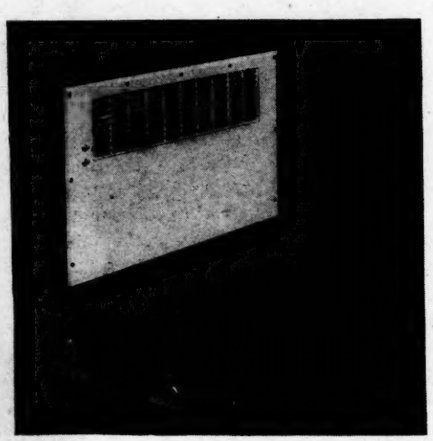


Bell&Gossett Tankless Water Heater

NAME—Bell & Gossett tankless water heater.
PURPOSE—An instantaneous type domestic water heater for utilizing boiler water as a source of heat.
FEATURES—Heater is designed to satisfy the demand for a heater of a high capacity, which can be installed in basements lacking space for storage tanks or where the service water conditions would make it necessary to use copper or other non-ferrous tanks. Only copper and bronze are used in all parts in contact with service water. Coils can be removed by unscrewing the bolts in the head and by loosening the lock nuts. Heating unit is completely enclosed in a steel jacket at slight extra cost.
SIZES AND CAPACITIES—Four sizes with capacities ranging from 140 to 300 g.p.h. with 180 F. boiler water.
MADE BY—*Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.*

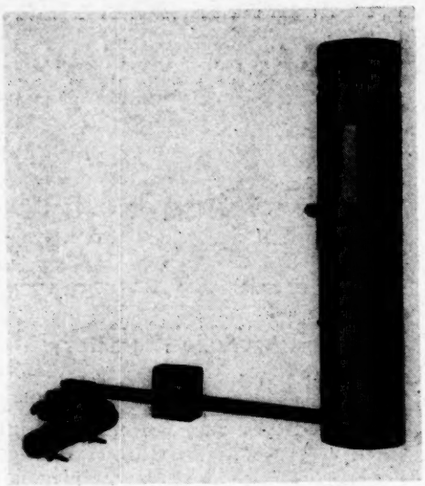
Crane Ductless A.C. Unit

NAME—Newport ductless air conditioning unit.
PURPOSE—For ventilating, warming, humidifying and distributing air in the home.
FEATURES—Although this unit is primarily intended for winter conditioning, it can also be used in the summer for filtering and circulating the air. Manufacturer claims that it can be easily installed in new or old buildings as it is designed for installation in the corner of the floor and wall.
MADE BY—*Crane Company, Chicago, Ill.*



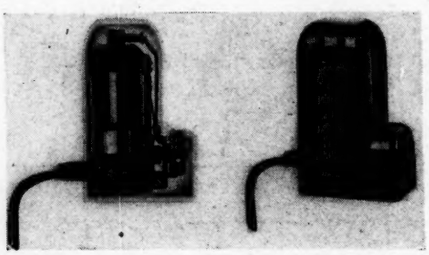
Minneapolis-Honeywell Tank Heater Regulator

NAME AND MODEL NUMBER—Metaphram tank heater regulator, type M509A.
PURPOSE—A regulator for controlling the draft on hot water heaters.
FEATURES—Regulator is designed to prevent overheating of the heater and to reduce the number of firing periods. The regulator clamps on the hot water pipe by means of straps, thus eliminating the need of draining the water

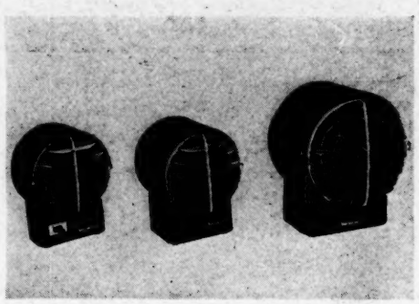


system at the time of the installation. It is normally installed on the pipe line between the heater and the tank which supplies hot water to the tank. The lever arm of the regulator is marked so that it may be set for the desired water temperature.
MADE BY—*National Regulator Div., Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.*

Sullivan Air Valve



NAME—Sullivan R.T.C. air valve.
PURPOSE—A thermostatic air valve for giving individual room temperature control on one-pipe steam heating systems.
FEATURES—Valve is designed to replace the ordinary air valve and it is said that it can be installed in a few minutes. The manufacturer states that by setting the dial any temperature between 60 and 80F can be maintained.
MADE BY—*Sullivan Valve & Engineering Co., Butte, Mont.*

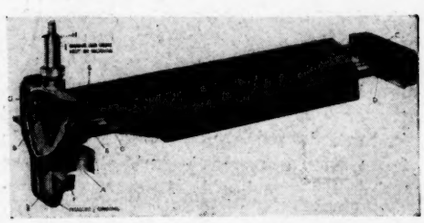


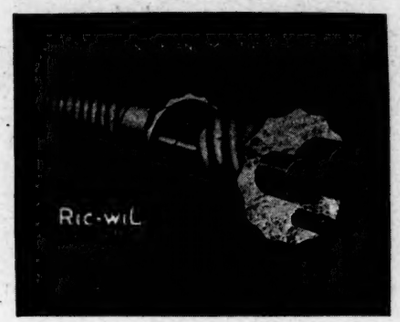
Wiegand Electric Unit Heaters

NAME AND MODEL NO.—Chromalox Type UB electric unit heaters.
PURPOSE—For heating offices, rooms in factories and like application.
FEATURES—Unit heater consists of a Chromalox Koilfin strip heating unit mounted in cylindrical housing. All connections are made inside the base which has a removable bottom cover. Louvers on the heater can be tilted to 30 degrees to direct the warm air stream downwards. Two, three, four and five kilowatt heaters have a handle on the top for portable use. Thermostatic switch opens a heater circuit if the normal operating temperatures are exceeded.
SIZES AND CAPACITIES—8 sizes with capacities ranging from 2 to 15 kw, air volumes from 260 to 600 c.f.m.
MADE BY—*Edwin L. Wiegand Company, Pittsburgh, Pa.*

Modine Convectors

NAME—Quiet-Seal.
PURPOSE—For use with one-pipe steam systems.
FEATURES—Manufacturer states that noiseless operation, no spitting and full heating capacity are the outstanding features of this new convector. It is said that the convector permits the simplified piping arrangement characteristic of one-pipe steam plans. Convector operates on a one-way principle, allowing steam, condensate and air to flow in the same direction, insuring full convector capacity at all times. A built-in trap of water seal is said to eliminate water hammer noises and squirting from air vents. This seal also permits easy venting of the convector and prevents air binding. Heating capacity is said to be equal to that of an ordinary two-pipe convector of the same size.
MADE BY—*Modine Manufacturing Co., Racine, Wis.*





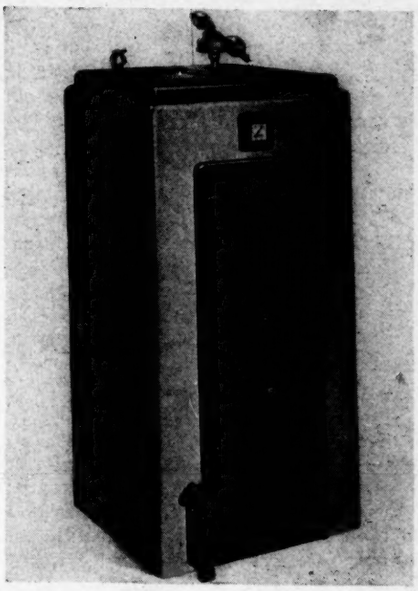
Ric-wiL Metal Steam Conduit

NAME—Ric-wiL insulated pipe units.
PURPOSE—For underground distribution of steam.
FEATURES — Units are of the self-contained sectional type completely assembled including steam pipe, supports, insulation, metal conduit housing and all accessories delivered in a prefabricated form all ready for the field welding. Material for conduit itself is Armco Hel-Cor spirally corrugated heavy gage pipe of pure ingot iron. The entire installation is a pre-sealed job which is said to insure water tightness. Conduit is heavy asphalt coated. Pipe units are furnished for either single or multiple pipe lines, in standard 20-ft. lengths or any other lengths desired. Standard insulation is 85% asbestos.
MADE BY — *Ric-wiL Co., Cleveland, Ohio.*

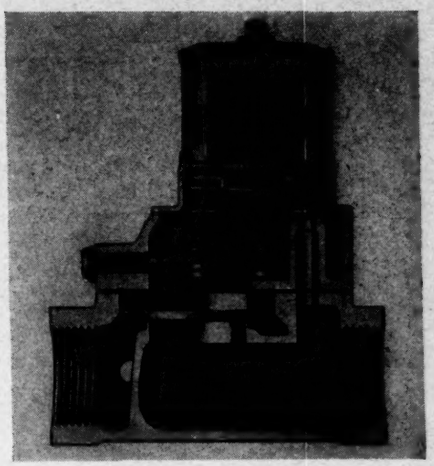
Anderson Air Release Valves

NAME—Anderson Silvertop air release valves.
PURPOSE—For automatically ridding pipe lines and other vessels of entrained air or any other gas.
FEATURES—The line includes three different styles of air release valves. First, the standard Silvertop which is made in six sizes (see illustration) from ½ to 2 in. inclusive for pressures up to 250 lb. per sq. in., second, the forged steel Silvertop for use on high pressures up to 1000 lb. per sq. in., and third, the Anderson No. "0" made for a maximum pressure of 150 lb. per sq. in. The release valves consist of a valve and fittings, a lever and ball float inside of a case. The inlet is at the bottom and the air vent is at the top. The liquid raises the float and holds the valve closed (a liquid is necessary to actuate the float; steam or other gases are not). An accumulation of air or gas lowers the liquid level, causing the float to drop. This opens the valve and vents the air or gas. Applications for the air release valve include hot water heating systems, brine lines, water mains, and for releasing air or gas from other liquid lines and tanks under pressure.
SIZES—Anderson No. "0", ¾ in. size.; standard Silvertop, six sizes from ½ to 2 in.; forged steel Silvertop, three sizes with pipe connections of ½, ¾, 1, 1¼, 1½ and 2 in.
MADE BY—*V. D. Anderson Company, Cleveland, Ohio.*

Two Crane Boilers



NAME & MODEL NO.—Crane boilers No. 10 and No. 110.
PURPOSE — For supplying steam or hot water using either coal or coke, oil or gas.
FEATURES—No. 10 boiler is designed for use with either coal, coke, oil or gas and the manufacturer says it is a simple matter to convert from one fuel to another. A 12 in. high grate and removable grate lugs facilitate conversion. A green jacket is provided for the boiler. No. 110 boiler is designed primarily for hand firing of coal, although it can be converted to stoker or oil burning. A patented feature on both boilers is its "controlled water travel" whereby it is claimed more heat is secured with no increase in fuel consumption.
MADE BY—*Crane Company, Chicago, Ill.*

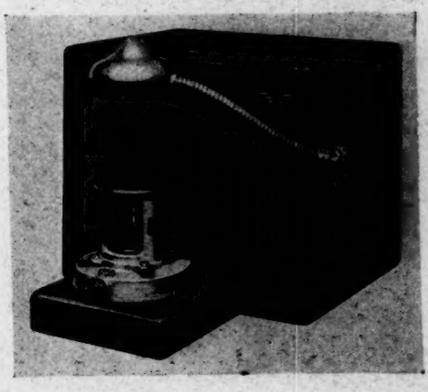


Friez Gas Valve

NAME—Slow-opening gas valve.
PURPOSE—A valve which regulates the gas flow to give a soft ignition at a low flame.
FEATURES — Valves incorporate a snap primary flow of adjustable volume, a hesitation period, allowing time for uniform draft to be established, followed by a slow opening to full capacity. This is said to provide a soft ignition at low flame followed by a gradual opening to full flame. The closing cycle is snap-acting. Valve operates on 20 volts.
SIZES—¾ and 1 in. pipe tap.
MADE BY—*Julien P. Friez & Sons, Baltimore, Md.*

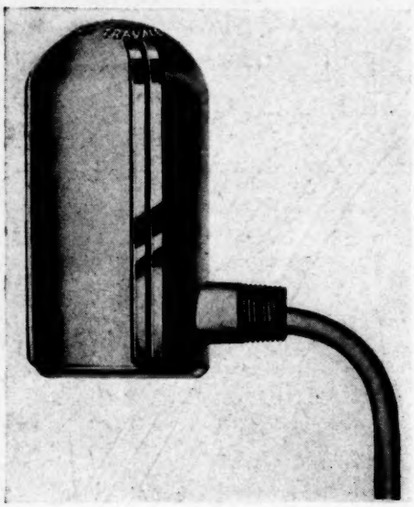
Sterling Condensation Pumps

NAME AND MODEL NUMBER — Sterlco 3900 Series condensation pumps.
PURPOSE — For the pressure return of condensate to boiler.
FEATURES — Cast iron receiving tank; high efficiency bronze fitted centrifugal pump, large water handling capacity with smaller motors without overloading; ball bearing motor; positive seal float switch; cadmium plated float.
SIZES AND CAPACITIES—Manufactured in simplex and duplex types for capacities 6000 sq. ft. EDR to 40,000 sq. ft. EDR, pressures 10 lb. to 40 lb.
MADE BY—*Sterling Engineering Co., Milwaukee, Wis.*



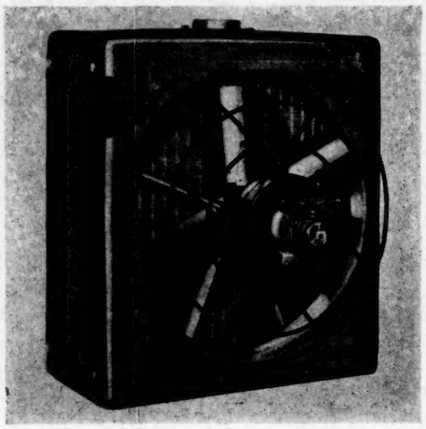
Marsh Air Valve

NAME—Marsh Travall.
PURPOSE—A low-cost valve for venting air from steam radiators.
FEATURES—Valve is of the non-adjustable type and utilizes the double wall construction formerly used in only the more expensive Marsh valves. Air is vented into the compartment formed by this double wall and leaves through a number of small ports in the outer shell. A large size float chamber is said to provide plenty of space for air and water separation, and the manufacturer states that this will eliminate spitting and float bobbing. The syphon pipe is designed to fit the narrowest radiator. Valve has a satin aluminum body with polished ribs.
TYPE AVAILABLE—⅛-in. angle pattern, ⅛-in. or ¼-in. straight pattern, and ¾-in. male straight pattern.
MADE BY—*Jas. P. Marsh Corp., Chicago, Ill.*



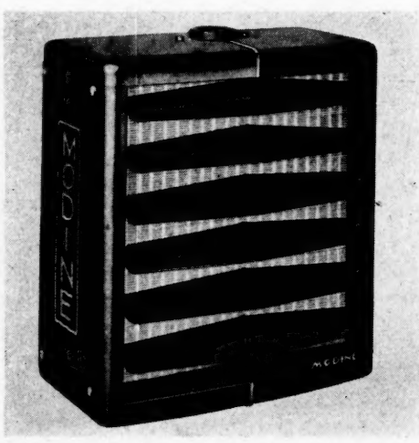
American Radiator Humidifier

NAME—Arco humidifier.
PURPOSE—An attachment for heating plants to add moisture to residences during the winter.
FEATURES—Humidifier has a 12-gal. evaporating capacity for each 24 hr. Air is drawn in from the outside or from the basement and moisture is added in a mixing chamber by means of a spray nozzle. Air then passes over a hot evaporator plate where it is tempered, and passes out through an air tube to the discharge grille. A humidistat governs the moisture content of the air. The manufacturer states that the device can be attached to warm water, vapor or steam boilers whether automatic or hand-fired.
MADE BY—*American Radiator Co., New York.*



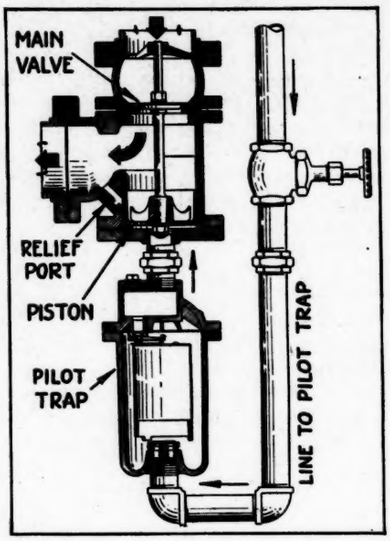
Modine Unit Heaters

NAME—Modine unit heaters.
PURPOSE—For space heating.
FEATURES—This new line of heaters incorporates such features as sound silencing, a safety fan guard built into the unit, rust protection, and a streamline appearance. The sound silencing is accomplished by 5 noise-abatement steps. First, the entire casing interior is lined with acoustical mastic. Second, a velocity generator evens air flow through the condenser and is said to eliminate air-rush noise peaks. Third, use of a venturi fan shroud reduces air in-rush noises. Fourth, concentric rings of the safety fan guard are provided to dissipate vibration and fifth, the unit heater motor is resiliently mounted in rubber on the fan guard. The new safety fan guard is said to form a rigid safety safeguard against the hazards that are also present when a unit fan is left without a proper shield. Manufacturer states that re-design of the unit provides cleaner, flowing lines, rounded casing corners and V-formed louvers deeply recessed. The new unit also provides for increased velocities without causing drafts.
MADE BY—*Modine Mfg. Co., Racine, Wis.*



Armstrong Giant Steam Trap

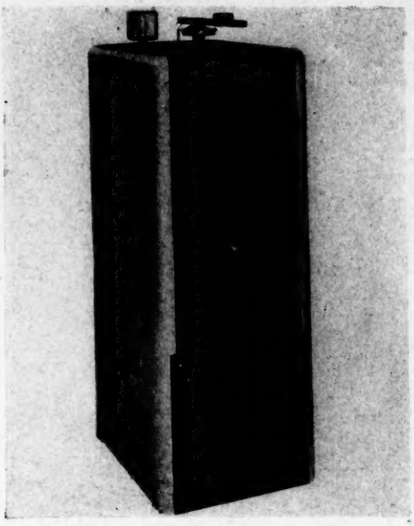
NAME—Armstrong Giant steam trap.
PURPOSE—For automatic drainage of large amounts of condensate.
FEATURES—Trap has 6 in. pipe connections and is rated at a continuous flow of 300,000 lb. of water per hr. at 50 lb. pressure. Unit consists of a large inverted bucket type pilot trap and a piston operated main valve. The main valve assembly is installed as an elbow in the drain line. The pilot trap is connected to the drain line at a point above the main valve assembly.



In this manner the main valve is kept sealed with water. The manufacturer states that the use of the inverted bucket type pilot trap makes the unit non-air binding. In operation, the condensate from the pilot trap discharges against the piston of the main valve forcing the piston upward until the relief port is uncovered. Upward movement of the piston is checked by using the piston skirt to cut down the area of the main outlet port. Snap action closing takes place when steam instead of water starts coming into the pilot trap and causes it to close.
MADE BY—*Armstrong Machine Works, Three Rivers, Mich.*

Herske & Timmis Convector

NAME—HT convector.
PURPOSE—A concealed convector for heating room air.
FEATURES—Convector consists of a 1¼-in. circular steel waterway, heavy gage steel fins, all fused together with a cast aluminum alloy core. The manufacturer states that there are no headers, gaskets, or tie rods used in this convector and that the steam passages are large and unrestricted. Convectors are available in all standard sizes and can be furnished to meet special requirements.
MADE BY—*Herske & Timmis, Inc., 33 W. 60th St., New York, N. Y.*

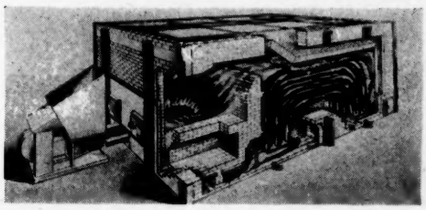


National Heat Extractor Boiler

NAME—National No. 1 series heat extractor.
PURPOSE—A boiler designed for the small house market and to be used with coal, oil, and gas with either steam or hot water.
FEATURES—Can be installed on first floor when basement is not available. Intermediate sections provided with extended heating surface and flues broken up into five passages. Of wet bottom design. New rocking beam type draft control provided. Sections have ground surfaces for drawing up iron to iron. Boiler jacket in red and black.
SIZES AND CAPACITIES—Available in 4 sizes with net loads for coal models from 170 to 350 sq. ft. of steam radiation or 275 to 550 sq. ft. of hot water. Ratings for oil-fired models from 230 to 430 of steam and 370 to 680 sq. ft. of hot water.
MADE BY—*National Radiator Company, Johnstown, Pa.*

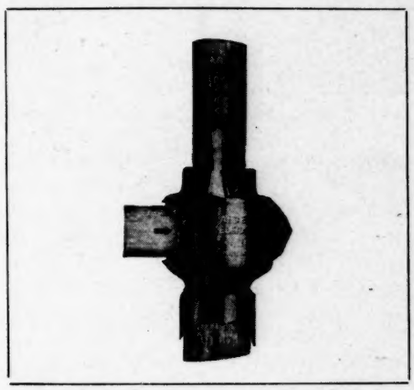
Lee Direct Air Heater

NAME—Lee Central system direct air heater.
PURPOSE—A direct type heating system using any type of fuel and designed for heating large and spacious buildings such as factories, hangars, garages, or churches.
FEATURES—The Lee system makes use of a centrally located air heater consisting of a combustion chamber, a bank of heater tubes, and an air circulating fan and an induced draft fan, both fans being mounted on the same motor shaft. Air from the building or air from the outside, or any proportional mixture of the two, is forced through the tubes and the warm air thus generated is delivered by means of ducts. Manufacturer states that the induced draft stack is small, and the heater can be installed anywhere and at any level. Construction depends upon the size, the larger units being brick encased and the smaller units steel-clad. It is stated that with coal, oil, gas, waste, lignite or other fuels, furnace can be fired either by hand or by the usual automatic devices. Manufacturer claims that the system is relatively inexpensive to install, utilizes fuel with a high degree of efficiency, responds quickly without over shooting, requires little or no maintenance and needs no licensed attendants.
MADE BY—*Lee Engineering Co., Union National Bank Building, Youngstown, Ohio.*

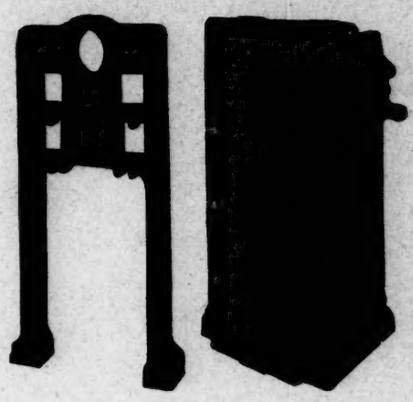


Albe Circulation Accelerator

NAME—Albe circulation accelerator.
PURPOSE—For increasing the circulation of water in service hot water systems.



FEATURES—The accelerator is connected in the return line from the bottom of the storage tank to the heater or boiler. When a faucet is opened the inlet cold water, because of its high pressure, is forced through a series of nozzles in the accelerator at a high speed. This high velocity nozzle stream discharging into the throat creates a suction which pulls with it six to ten times as much water from the bottom of the storage tank. This mixture is then pushed through the neck of the accelerator into the heater. It is said that the heat is rapidly absorbed by the accelerated water and is transferred quickly into the tank, avoiding heat dissipation into the cellar and stack.
SIZES—Made in four sizes for tanks from 120 to 5000 gal.
MADE BY—*Albe Pump Corp., 8 Berry St., Brooklyn, N. Y.*

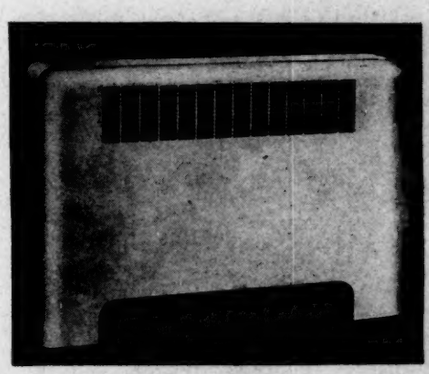


Burnham Boiler

NAME—Junior Yello-Jacket boiler.
PURPOSE—For supplying steam or hot water.
FEATURES—Section legs of boiler have been extended to form the base making what is equivalent to a one-piece boiler as it is shipped with its three sections all assembled. To further cut down installation costs, the jacket is made in only four pieces which slip together easily. Although this is an all fuel boiler, only the oil model is ready for the market. There is a removable extension to the jacket for those who desire the burner enclosed.
CAPACITY—Model YS-1-A, 300 sq. ft. installed radiator steam. Model YW-1-A, 480 sq. ft. installed hot water radiator.
MADE BY—*Burnham Boiler Corporation, Irvington, N. Y.*

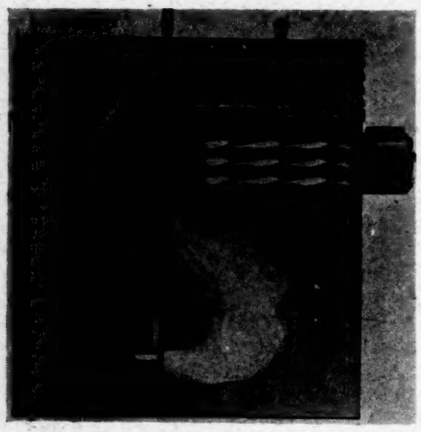
Commodore Convectofin Inclosure

NAME—Modern Style Convectofin.
PURPOSE—A modern inclosure for Convectofin heating convectors.
FEATURES—This inclosure is designed to harmonize with today's room furnishings and decorations and is to be used with the Commodore line of convectors.
MADE BY—*Commodore Heaters Corp., 11 W. 42nd St., New York, N. Y.*



Fitzgibbons Steel Boiler

NAME AND MODEL NUMBER—Fitzgibbons 400 series steel boiler.
PURPOSE—For use with steam, vapor, vacuum, or hot water heating systems utilizing oil, gas, or coal as a fuel.
FEATURES—The following features are said to be incorporated in this new steel boiler: copper-steel welded construction throughout, large combustion area, domestic hot water supply—tankless or with storage tankheater, heavy insulation, refractory-lined service door, standard location of controls, equipped for low water cutoff, enclosing jacket for concealed mechanically-fired units and standard jackets for exposed mechanically fired units.
SIZES—Made in three sizes beginning at 400 sq. ft.
MADE BY—*Fitzgibbons Boiler Co., Inc., New York.*



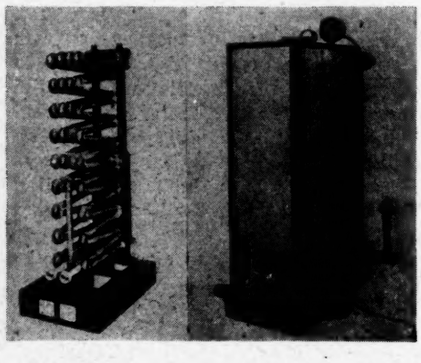
McAlear Motor Operated Valve and Dampers

NAME—Electric motor operated valve and dampers.
PURPOSE—For opening and closing all kinds of valves by either automatic or remote control.
FEATURES—The motor equipment can be swung to any position on the valve, either in line with the pipe or at right angles to it and will operate in any position. Equipment is made both for on and off and reversing. The reversing type can be used for throttling a valve by the use of push-button control or automatic control. The motor does not contain any automatic positioning device. Positioning equipment must be a separate, automatic device. Motor is of high torque and various speeds from 15 sec. to 3½ min. per stroke. It is equipped with spring tension device to hold the valve disc tight on its seat to take up air and dirt, and is also equipped with a safety clutch to prevent damage to the motor when foreign matter lodges in the valve. This clutch also permits hand operation should the electric power not

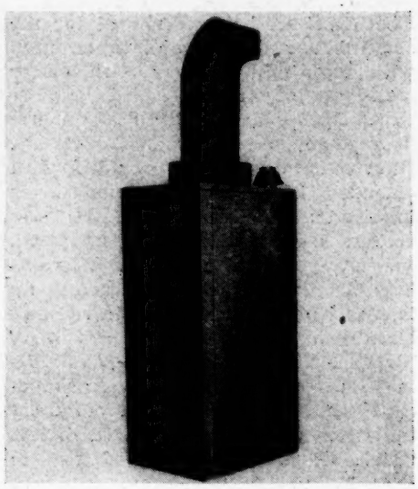
be available. The valve stem thrust cam is full ball bearing and grease packed.
SIZES AND CAPACITIES—Can be furnished for any kind of valve except plug valve in sizes ½ in. to 6 in., inclusive. Torque rating, based on 90 sec. stroke, 18 ft.-lb. using both 110 volt and 24 volt, 60 cycle a.c. shaded pole motor.
LITERATURE AVAILABLE—Bulletin M-1600.
MADE BY—*The McAlear Mfg. Co., 1901 So. Western Ave., Chicago, Ill.*

Halloran Gas-Fired Boiler

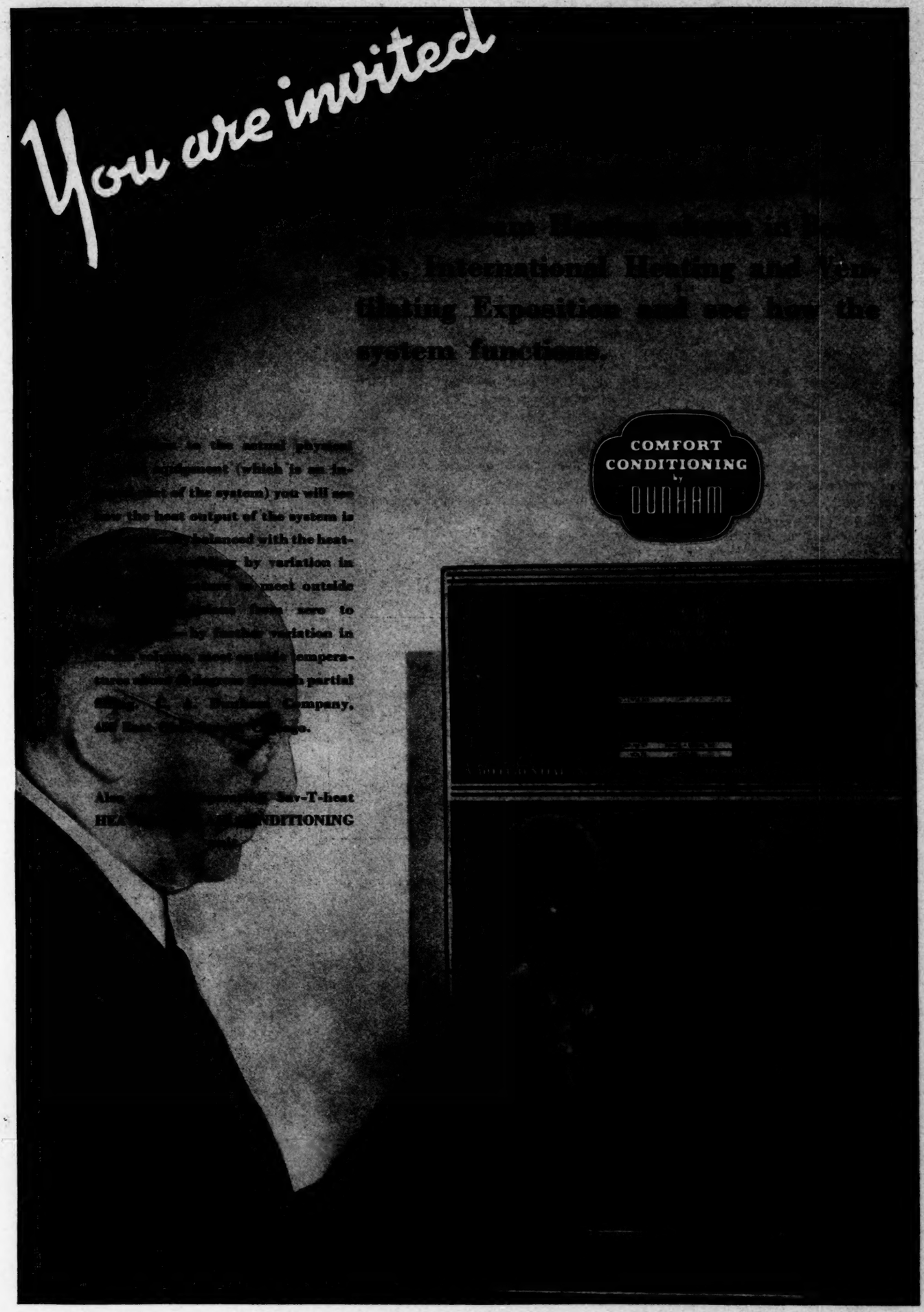
NAME—Coprtube gas-fired boiler.
PURPOSE—For supplying hot water using natural or manufactured gas as a fuel.
FEATURES—Boiler is made up of hard drawn copper tubing, cast bronze U-bends and steel box headers all brazed together to form a unit, also burners and sheet metal casing. Boilers are made in seven models with from two to eight burners and all models use the same tubing assembly, differing only in the number of burners and tubing assemblies. The gas manifold assemblies and controls as shown on the two-burner model (see illustration) are standard on all models except that the gas burner manifold is larger in diameter to carry larger controls and is lengthened to accommodate additional burner valves. Boiler is equipped with motorized gas valve, pilot assembly, immersion water temperature control, gas pressure regulator, water relief valve, shut-off valve and altitude and thermometer gage. It is approved by the American Gas Association for both manufactured and natural gas.
SIZES AND CAPACITIES—Seven models from two to eight burners rated at 75,000 B.t.u. input per burner and 400 sq. ft. hot water EDR per burner.
MADE BY—*The Halloran Co., Memphis, Tenn.*



American Gas Floor Type Unit Heater

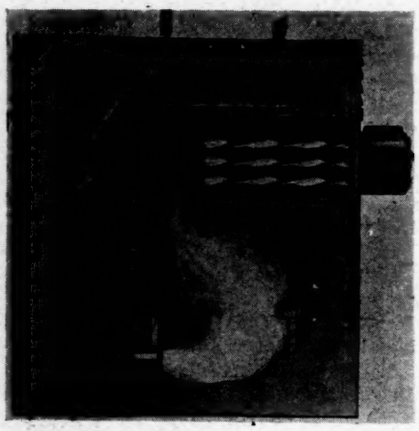


NAME AND MODEL NUMBER—AGP floor type unit heater, Type 1-FP-U.
PURPOSE—A gas-fired floor type unit heater.
FEATURES—Heater has the same type of cored cast iron heating section as is utilized in the AGP gas-fired air conditioners of the parallel-flow and counter-flow types. Air is drawn into the intake grille at the side of the casing at the floor level, is heated as the fan in the base blows it over the heat exchanger and is discharged through a diffusing cowl above the head level. Fan is a double inlet, Sirocco a.c. type with die formed. streamlined inlets. The cowl is square, permitting discharge connection on either side, front, or back.
SIZES AND CAPACITIES—Four sizes with hourly inputs from 56,000 to 150,000 B.t.u. per hr.
MADE BY—*American Gas Products Div., American Radiator Co., 40 W. 40th St., New York.*


You are invited
COMFORT
CONDITIONING
by
DUNHAM

Fitzgibbons Steel Boiler

NAME AND MODEL NUMBER—Fitzgibbons 400 series steel boiler.
PURPOSE—For use with steam, vapor, vacuum, or hot water heating systems utilizing oil, gas, or coal as a fuel.
FEATURES—The following features are said to be incorporated in this new steel boiler: copper-steel welded construction throughout, large combustion area, domestic hot water supply—tankless or with storage tankheater, heavy insulation, refractory-lined service door, standard location of controls, equipped for low water cutoff, enclosing jacket for concealed mechanically-fired units and standard jackets for exposed mechanically fired units.
SIZES—Made in three sizes beginning at 400 sq. ft.
MADE BY—*Fitzgibbons Boiler Co., Inc., New York.*



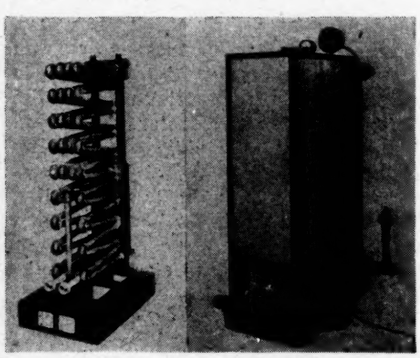
McAlear Motor Operated Valve and Dampers

NAME—Electric motor operated valve and dampers.
PURPOSE—For opening and closing all kinds of valves by either automatic or remote control.
FEATURES—The motor equipment can be swung to any position on the valve, either in line with the pipe or at right angles to it and will operate in any position. Equipment is made both for on and off and reversing. The reversing type can be used for throttling a valve by the use of push-button control or automatic control. The motor does not contain any automatic positioning device. Positioning equipment must be a separate, automatic device. Motor is of high torque and various speeds from 15 sec. to 3½ min. per stroke. It is equipped with spring tension device to hold the valve disc tight on its seat to take up air and dirt, and is also equipped with a safety clutch to prevent damage to the motor when foreign matter lodges in the valve. This clutch also permits hand operation should the electric power not

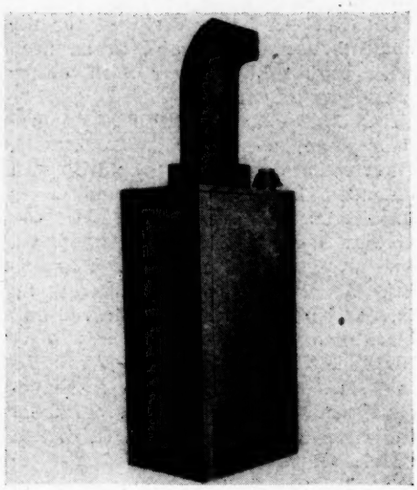
be available. The valve stem thrust cam is full ball bearing and grease packed.
SIZES AND CAPACITIES—Can be furnished for any kind of valve except plug valve in sizes ½ in. to 6 in., inclusive. Torque rating, based on 90 sec. stroke, 18 ft.-lb. using both 110 volt and 24 volt, 60 cycle a.c. shaded pole motor.
LITERATURE AVAILABLE—Bulletin M-1600.
MADE BY—*The McAlear Mfg. Co., 1901 So. Western Ave., Chicago, Ill.*

Halloran Gas-Fired Boiler

NAME—Coprtube gas-fired boiler.
PURPOSE—For supplying hot water using natural or manufactured gas as a fuel.
FEATURES—Boiler is made up of hard drawn copper tubing, cast bronze U-bends and steel box headers all brazed together to form a unit, also burners and sheet metal casing. Boilers are made in seven models with from two to eight burners and all models use the same tubing assembly, differing only in the number of burners and tubing assemblies. The gas manifold assemblies and controls as shown on the two-burner model (see illustration) are standard on all models except that the gas burner manifold is larger in diameter to carry larger controls and is lengthened to accommodate additional burner valves. Boiler is equipped with motorized gas valve, pilot assembly, immersion water temperature control, gas pressure regulator, water relief valve, shut-off valve and altitude and thermometer gage. It is approved by the American Gas Association for both manufactured and natural gas.
SIZES AND CAPACITIES—Seven models from two to eight burners rated at 75,000 B.t.u. input per burner and 400 sq. ft. hot water EDR per burner.
MADE BY—*The Halloran Co., Memphis, Tenn.*



American Gas Floor Type Unit Heater



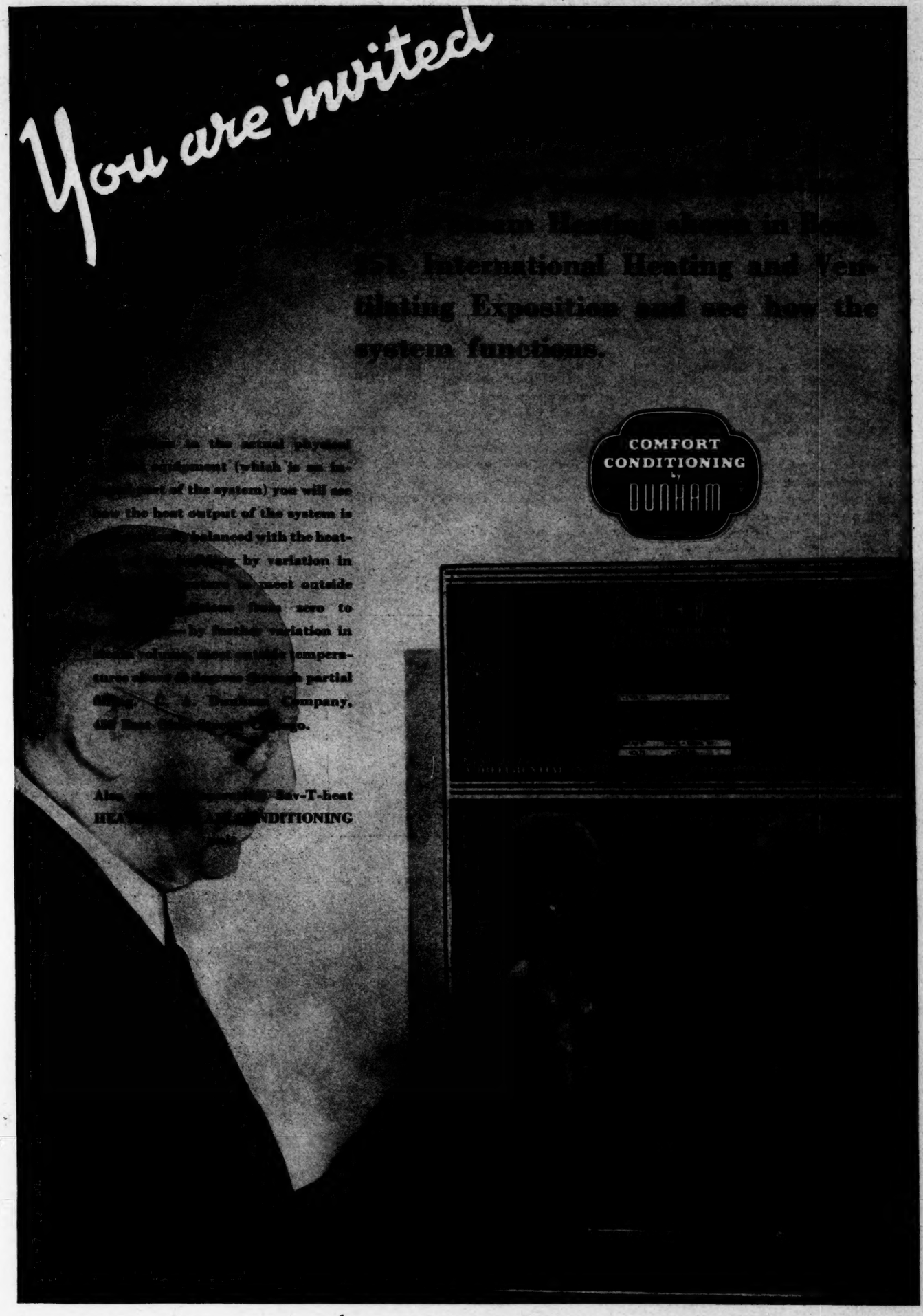
NAME AND MODEL NUMBER—AGP floor type unit heater, Type 1-FP-U.
PURPOSE—A gas-fired floor type unit heater.
FEATURES—Heater has the same type of cored cast iron heating section as is utilized in the AGP gas-fired air conditioners of the parallel-flow and counter-flow types. Air is drawn into the intake grille at the side of the casing at the floor level, is heated as the fan in the base blows it over the heat exchanger and is discharged through a diffusing cowl above the head level. Fan is a double inlet, Sirocco a.c. type with die formed. streamlined inlets. The cowl is square, permitting discharge connection on either side, front, or back.
SIZES AND CAPACITIES—Four sizes with hourly inputs from 56,000 to 150,000 B.t.u. per hr.
MADE BY—*American Gas Products Div., American Radiator Co., 40 W. 40th St., New York.*

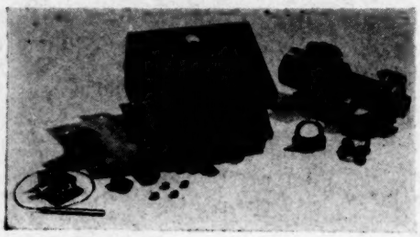
You are invited

...Heating display at the ...st. International Heating and Ventilating Exposition and see how the system functions.

...to the actual physical ...equipment (which is an integral part of the system) you will see how the heat output of the system is ...balanced with the heat-... by variation in ...to meet outside ...from zero to ...by further variation in ...temperatures above or below zero with partial ... G. A. Dunham Company, ... Chicago.

Also ... Sav-T-heat HEA... CONDITIONING ...





Purdue Viscous Liquid Heater

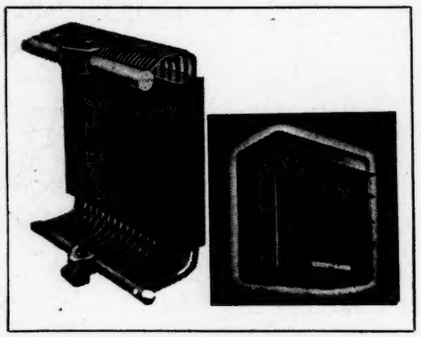
NAME—Lines Thermal Electric Conduction System.
PURPOSE—For heating viscous liquids such as fuel oils.
FEATURES—The manufacturer states that this system of heating liquids utilizes a new principle which permits heating of the oil from a point inside of the tank to the point of use. Temperature is thermostatically controlled throughout the length of piping. Unit consists of a transformer, tank unit and thermostat. The transformer supplies electrical energy to make the entire pipe system from the tank to the burner a long heating unit. The oil is thus continually heated as it flows from the tank to the oil burner. Proper temperature is maintained by the thermostat. Unit requires a source of electric power with a voltage of 110, 220, 440 of 60 cycle, single or polyphase characteristics.
MADE BY—*Albert G. Purdue Associates, 303 Wooster, New Haven, Conn.*

Westinghouse Oil Burner Motors

NAME—Thermoguard protected oil burner motors.
PURPOSE—Motors with positive protection against burn-out for domestic oil burner service.
FEATURES—Manufacturer states that the Thermoguard feature gives protection against burn-out caused by continuous and frequently repeated overloads, high ambient temperature, high motor current due to locked shaft or low voltage or other conditions creating a dangerous temperature. Two types of Thermoguard protection are available—time delay and manual reset. The time delay type is designed for burners with intermittent ignition systems. The time delay feature prevents restarting under dangerous conditions and insures automatic protection for the motor. The manual reset type does not reset automatically. Motors can be supplied in foot as well as flange mounting, either rigid or resilient. They are of split phase, general purpose type and are suitable for domestic oil burner application up to one-third hp. at standard speeds on 110 to 220 volt circuits.
MADE BY—*Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.*

Herman Nelson Unit Heaters

NAME — Propeller-Fan type hiJet heater.
PURPOSE—For supplying warm air using steam as the heating medium.
FEATURES—A patented "Stay Tube" has been built into the heating element between the supply and return headers to allow any entrained moisture which might otherwise be carried over into the heater to drain directly from the supply header to the return header without entering the other tubes of the heating element. If this entrained moisture is corrosive, as is sometimes the case, it will at first affect the "Stay Tube" which is made four times as heavy as the other tubes in the heating element, therefore, states the manufacturer, longer life is assured. Another function of the "Stay Tube" is to maintain the proper relationship between the supply and return headers and thus leave the loops free to take care of only the expansion and contraction between individual tubes.
SIZES AND CAPACITIES—18 sizes with capacities ranging from 15,450 B.t.u. per hr. to 350,000 B.t.u. per hr.
MADE BY—*Herman Nelson Corp., Moline, Ill.*



McLeod & Henry Baffle Plates

NAME—Steel mixture refractory baffle plates.
PURPOSE—A refractory baffle plate designed to be suspended over the fuel bed in domestic stoker furnaces.
FEATURES—These plates are made from "steel mixture" quality Pennsylvania fire clay refractory which is said to have a fusion point of approximately 3200F and to be highly resistant to spalling from frequent temperature changes. The baffle is installed by placing the two halves together and utilizing a tongue and groove joint to align them. A cast-iron clamp is placed on the lug on top of the baffle and one end of a chain or rod is then attached to the clamp and the other end to some overhead projection inside the furnace.
SIZES AND STYLES—Stock sizes, 12, 14, 16, 18, 20, 22, and 24 in. diameters. Rectangular baffles are 14 x 12, 16 x 12, 18 x 14, 20 x 14, 22 x 16, and 24 x 16 in.
MADE BY—*McLeod & Henry Co., Inc., Troy, N. Y.*

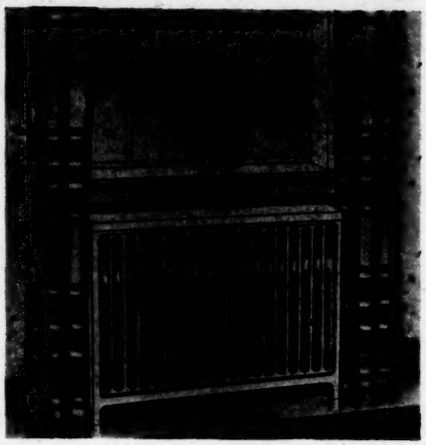


Fig. 1. Exterior of Solray radiators.

Weil-McLain Radiator

NAME—Solray radiators.
PURPOSE—For supplying both radiant and convected heat and also for humidifying air.
FEATURES—Radiators consist of an outer casing through which steam or hot water flows and which gives off radiant heat. Within this casing is a convector unit which is called a finned Vectant and which is designed to provide convected heat. Since these radiators are designed to give radiant heat, they are not intended as concealed radiators but may be placed in an open recess when ample clearance is provided at ends and top. The manufacturer states that these radiators combat cold effectively since the convected heat meets the cold where cold comes in and provides moderate undisturbing air circulation and the radiant heat travels out into the lower occupied portion of the room to raise floor temperatures. Radiators are also available with hand filled pans or automatic filled pans for humidifying the air. Manufacturer states that one automatic filled radiator will provide practical humidification for the average 6 to 8 room house. Radiators are available without finned Vectants, with a single row of finned Vectants or with a double row of finned Vectants.
MADE BY—*Weil-McLain Company, Radiator Division, Erie, Pa.*

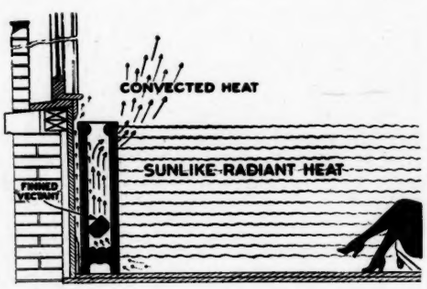
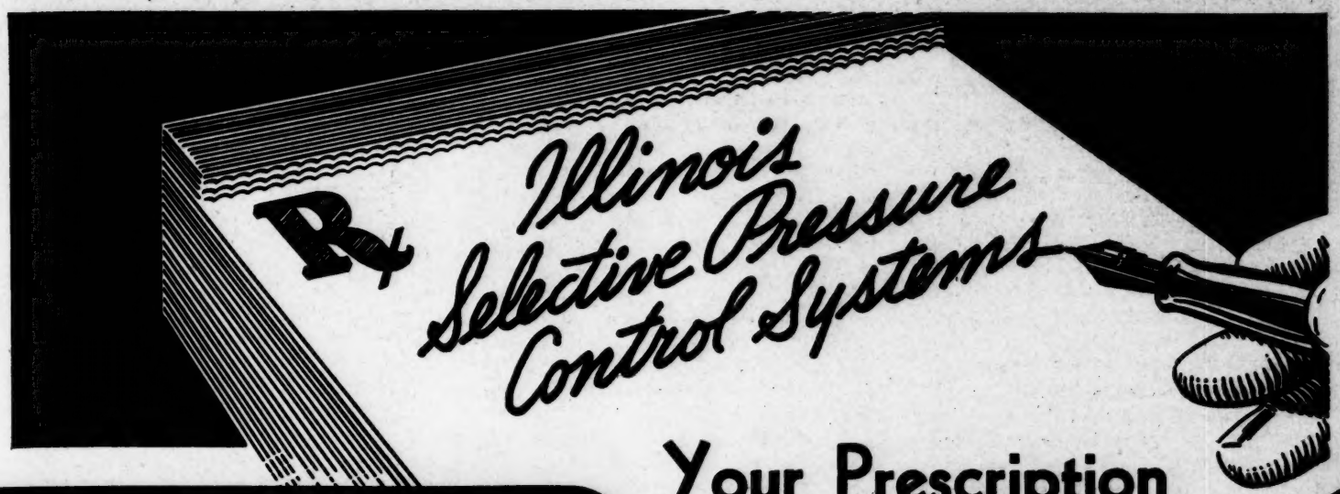
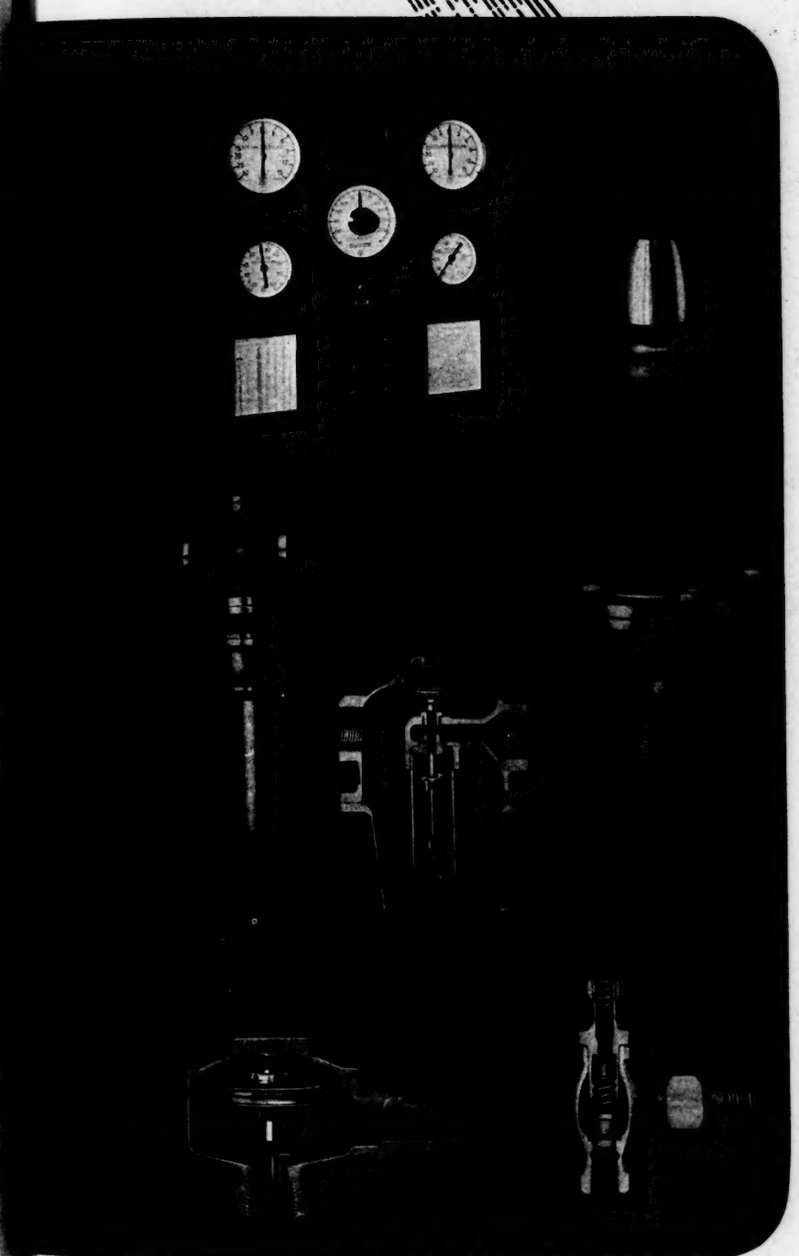


Fig. 2. A cross sectional view showing how Solray radiators operate.





Your Prescription for Heating Economy and Comfort

Illinois Selective Pressure Control Systems are individually engineered to meet every condition of steam circulation and regulation of combustion. They open a new field for control systems in apartments, schools, churches, commercial and public buildings —control that heretofore has been adaptable to only the larger heating installations.

That these systems are in wide use in leading universities and engineering schools offers convincing evidence of their outstanding merit.

In addition to new work, existing vapor or vacuum installations of any size may be changed over at low cost to ILLINOIS SELECTIVE PRESSURE SYSTEMS to give the convenience and economy of perfect control.

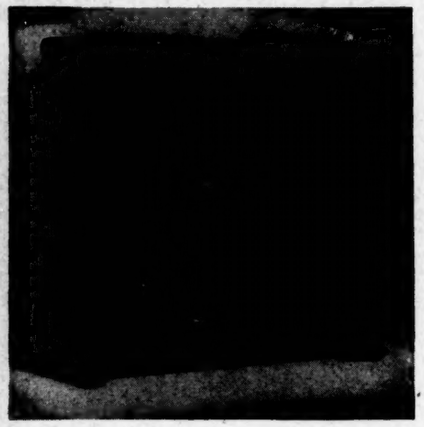
Write for bulletins 16, 517 and 62 or phone our representative in your territory.

ILLINOIS SELECTIVE PRESSURE CONTROL SYSTEMS
Heat Conditioning for Comfort

ILLINOIS ENGINEERING COMPANY
2045 SOUTH RACINE AVENUE, CHICAGO

Crane Basmor Heating System

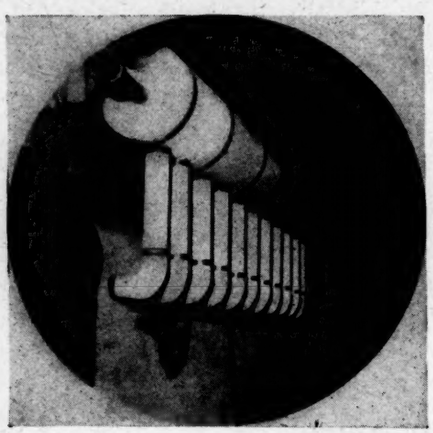
NAME — Basmor Balanced-Sustained heating system.
PURPOSE—For heating buildings using gas as a fuel.
FEATURES—Heating system is of the single main, forced hot water type and is furnished complete by one source of supply. System consists of a Basmor gas-fired hot water boiler, Crane hot water circulator, Mono-flow fittings, Crane radiators or convectors and anticipating type thermostat. A Newport unit may also be used for providing humidification, filtration and circulation of air. The manufacturer states that the system provides a "sustained" or continuous supply of heat because the heating medium is hot water and the radiation surface cast iron. The manufacturer also claims that the system provides a "balanced" or controlled amount of heat since the water temperature is varied and the proper amount of heat is brought to radiator



to meet room heat loss. It is stated that the boiler used with this system may be placed in basement or in kitchen, alcove or extra room. The boiler combustion chamber is completely surrounded by water passages while the burners are of the improved bunsen type.
SIZES—Complete range of sizes for small buildings.
MADE BY — *Boiler made by Bastian-Morley Co., Inc., La Porte, Indiana. Other parts made by—Crane Company. Chicago, Ill.*
DISTRIBUTED BY—*Crane Company. Chicago, Ill.*

Taco Water Heater

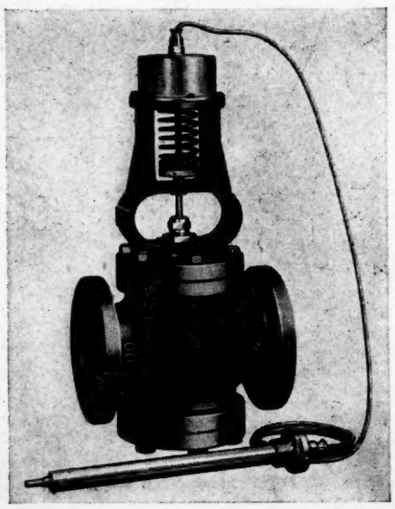
NAME—Hi-Flow Tankless Taco.
PURPOSE—For use with large cast-iron steam boilers for supplying domestic hot water.
FEATURES—Indirect heater consists of a number of water tubes through which the water to be heated flows, and a shell which holds the boiler water. Boiler water is carried from



the boiler to the heater by pipes tapped into each section of the boiler. Unusual feature of this heater is that it can be installed at a height of 30 in. or more above the boiler water line and a vacuum is utilized for holding the boiler water in the heater.
SIZES AND CAPACITIES—18 models with capacities ranging from 280 to 835 gal. per hr. 100F rise with boiler water at 180F.
MADE BY — *Taco Heaters, Inc., 342 Madison Ave., New York, N. Y.*

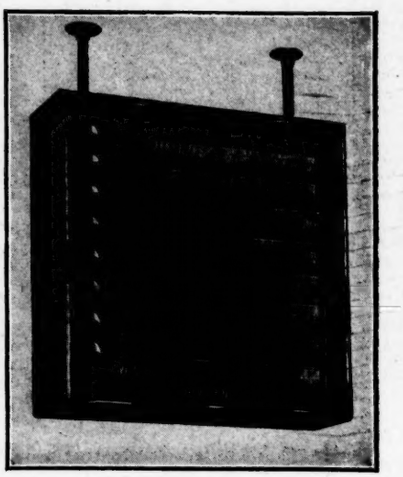
McAlear Temperature Controller

NAME — McAlear temperature controller.
PURPOSE — For direct control of liquid and gas temperatures.
FEATURES—Controller is said to be adaptable to boiler feed water heaters, hot water tanks, evaporators, and other applications where a uniform temperature must be maintained. Valve is bellows operated.
SIZES—Valve construction of bronze, screwed ends only, ½ to 2 in., inclusive. Semi-steel, with bronze or stainless steel trim, screwed or flanged, ½ to 4 in. inclusive. Larger sizes on special order.
MADE BY — *McAlear Manufacturing Co., 1901 S. Western Ave., Chicago, Ill.*



Kramer Unit Heaters

NAME—Kramer unit heaters.
PURPOSE—A unit type heater for air heating utilizing hot water or steam.
FEATURES—The heater or condensing coil consists of a series of horizontally placed, hair-pin tube bends, oval in cross section, with one end of one leg brazed into a cylindrical steam supply manifold and the other end into a return manifold. This bend is provided to take care of thermal expansion and contraction. The entire heating element is constructed of copper. A die formed, streamline steel frame encloses the heating element. This frame is finished in twilight-gray crackle enamel baked on. Integral with the back of the frame is a die formed air inlet housing the fan. The unit heater may be used with any steam pressures up to 150 lb. per sq. in.
SIZES AND CAPACITIES—Made in 16 sizes with capacities ranging from 18,700 to 237,000 B.t.u. per hr. with 70F entering air and 2 lb. steam.

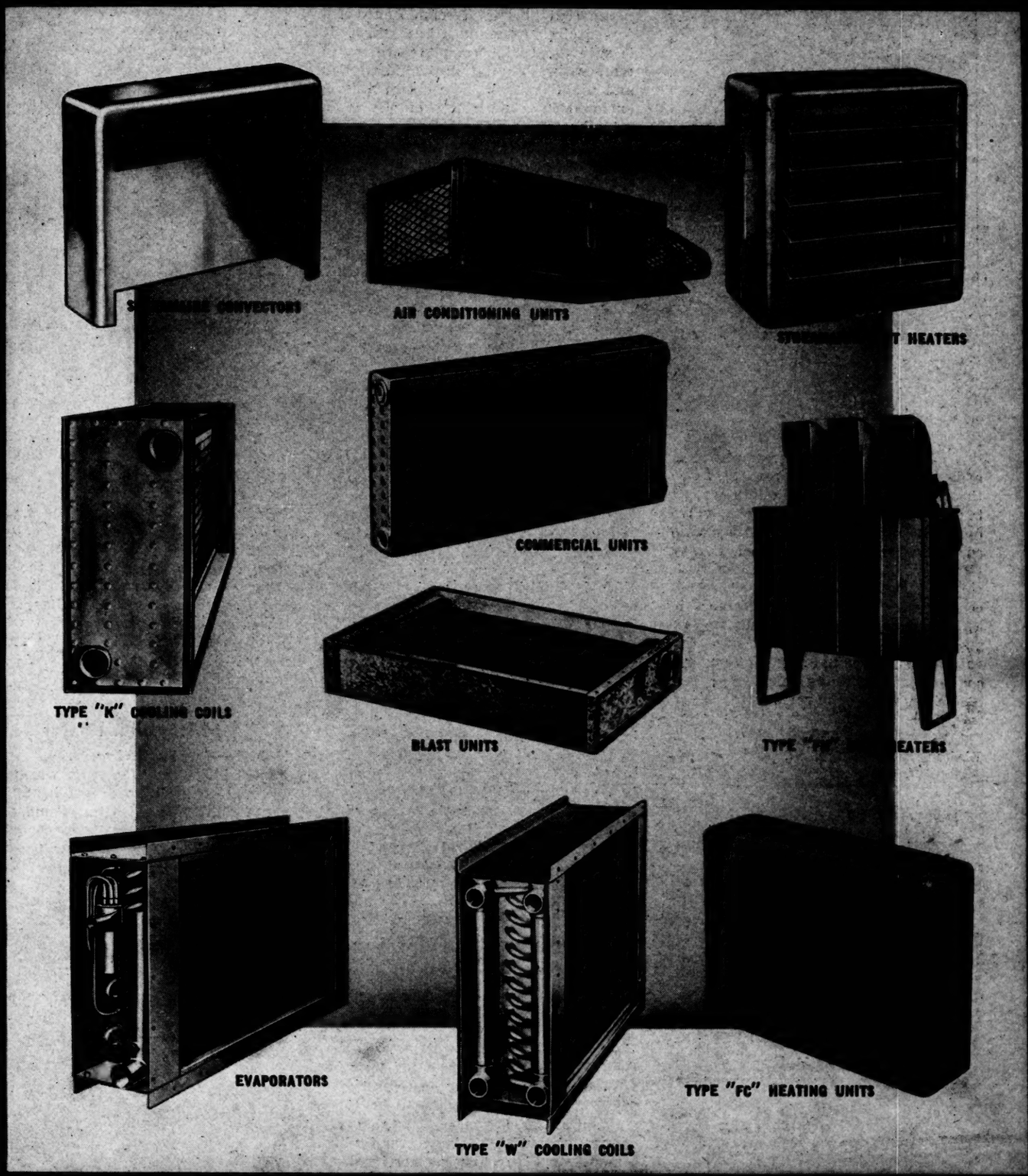


LITERATURE—Bulletin H 139.
MADE BY—*Kramer Trenton Company, Trenton, N. J.*

Oil City Fire Observer

NAME—"Oil City" Fire Observer.
PURPOSE—For inspection of fuel bed. furnace walls, and tubes without admitting cold air into furnace.
FEATURES—Fire observer has a wide opening or port covered on the inside by a shutter, with all infiltration of air eliminated. When the shutter is raised, the port is opened and the colored Pyrex glass on the outside diffuses the glare and permits a safe, clear vision of the furnace. When the handle is released, the cover closes the port. The fire observer is equipped with a Monel metal screen inserted in back of the lens, which protects it when the shutter is opened.
MADE BY—*Oil City Tank & Boiler Company, Oil City, Pa.*

YOUNG



YOUNG products carry an enviable reputation in the fields of heating, cooling and air conditioning, due to their durable construction and fine performance. Each product is designed with a practical knowledge of requirements of the architect, engineer, contractor and ultimate owner. There are no shortcomings or freak designs to sacrifice performance for low manufacturing costs. Each unit is sold on a guaranteed capacity rating. If you have a heating, cooling or air conditioning problem, there is no easier way to solve it than to consult a YOUNG catalog or to call the YOUNG engineer in your community. Each product illustrated is cataloged in various sizes and capacities to fit specific heating or cooling jobs with any type of system. A competent YOUNG engineer will gladly work out your problems for you. Thousands of engineers and contractors are demanding this service — why not you? There is no cost or obligation. Write for literature.

OFFICES IN ALL

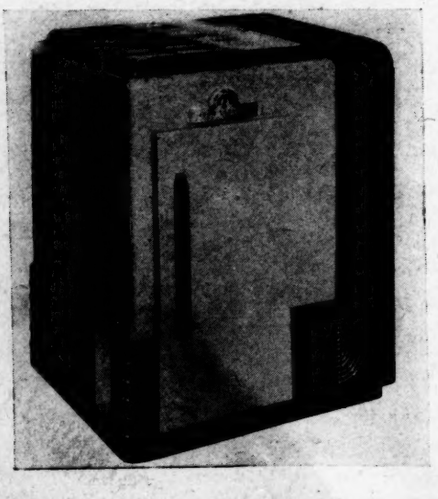
YOUNG RADIATOR COMPANY

Bell & Gossett Motorized Valve

NAME—B & G motorized valve.
PURPOSE — For controlling the flow of water from boiler to mains in hot water heating systems.
FEATURES—Valve is designed especially for use with hot water heating systems and features a straight-through construction to eliminate air binding. It is said that the valve opens in a few seconds and uses no current when opened or closed. It may be installed in either vertical or horizontal types and in any position except upside down. Transformer is furnished separately for mounting on any convenient outlet box and the valve has an auxiliary low-voltage contact for energizing relay.
SIZES—Made in four sizes for pipes from 1 in. to 2 in.
MADE BY—*Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.*

Iron Fireman Unit Heatmaker

NAME—Iron Fireman Unit Heatmaker.
PURPOSE—For supplying warmed, humidified, and circulated air in homes and small business structures. Uses bituminous or anthracite coal as a fuel.



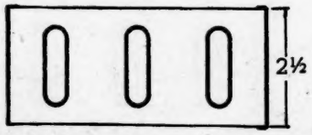
FEATURES—The Unit Heatmaker is a combination of a hopper model automatic coal burner, a room furnace, a forced circulator, and a humidifier. It is said to provide complete automatic temperature regulation including day and night control. The entire unit is enclosed in a modern cabinet. It is said that great pains have been taken to insure dustless operation and special provision has been made for the removal of ash and clinker. An ash receptacle is installed inside the door where it is sealed from the circulated air. Fumes pass into the heater and not into the room. The hopper lid is furnished with a rubber seal to make it dust-tight.
SIZES AND CAPACITIES—Made in two series, 200 and 400. The 200 series hoppers will hold 200 lb. of coal and the fans will supply 600 c.f.m. at an average temperature of 250F. Hoppers of 400 series units will hold 350 lb. of coal and the fans will supply 1200 c.f.m. at 250F.
MADE BY—*Iron Fireman Manufacturing Co., Cleveland, Ohio, and Portland, Oreg.*

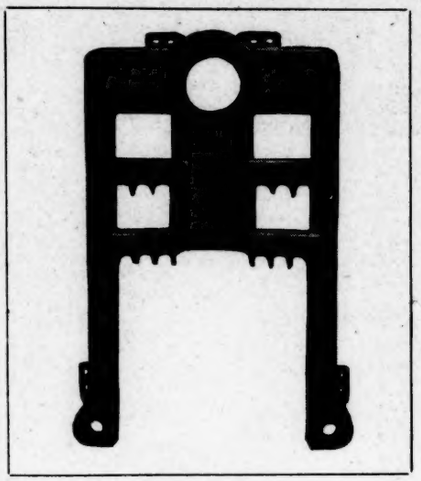
Harvey-Whipple Steel Boiler

NAME—Heet-Generator all-steel boiler.
PURPOSE—For supplying steam utilizing oil as a fuel.
FEATURES—Boiler is of welded steel construction throughout, with a series of crowned sections one above the other, each section containing a thin layer of water. It is said that flue gases must completely fill the space between each set of crown sections before passing up into the next section, resulting in an extremely long flue travel, low stack temperature, and high efficiency. Boiler is housed in a streamlined cabinet. Enclosed within the cabinet is a Master Kraft tankless domestic water heater.
MADE BY — *Harvey-Whipple, Inc., Springfield, Mass.*

Tuttle & Bailey Hot Water Copper Convectors

NAME—Copper convector.
PURPOSE—Copper convector for use with hot water heating systems.
FEATURES—Convector has a heating element which is made of large oval copper tubes with 2½-in. fins and with a new type of wrought copper header.
MADE BY—*Tuttle & Bailey, Inc., New Britain, Conn.*



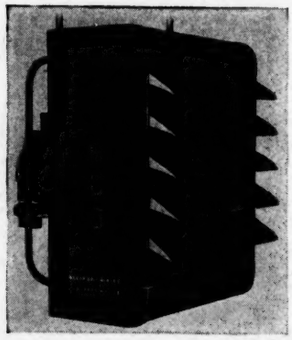


Burnham Boiler

NAME—Burnham Yello-Jacket boiler.
PURPOSE—For supplying steam or hot water using oil, gas, or coal as a fuel.
FEATURES—The manufacturer states that this boiler will operate with a small chimney and that it is designed to retard the flow of flue gases so as to cut down chimney loss due to intermittent firing of oil, coal, or gas. The surfaces upon which the fire shines have been extended to increase the fuel economy. The boiler is enclosed in a light yellow jacket which can be made to totally enclose an oil
MADE BY—*Burnham Boiler Corp., Irvington, N. Y.*

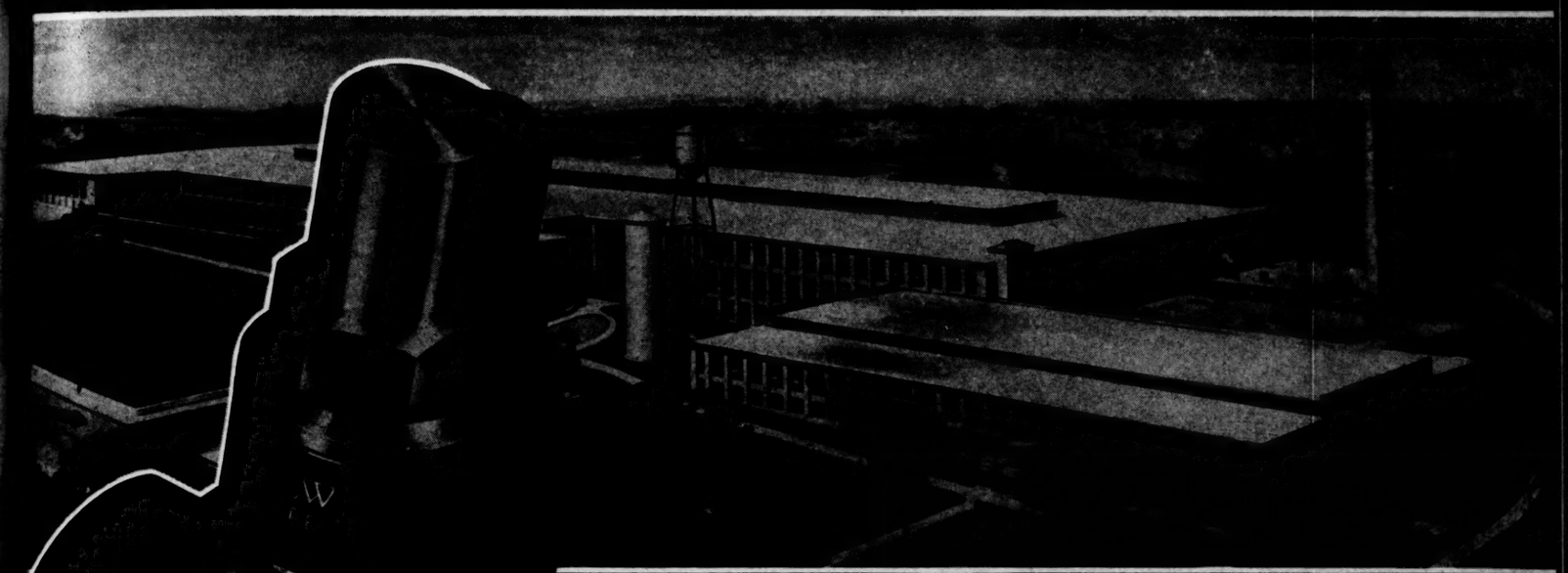
Murray Unit Heater

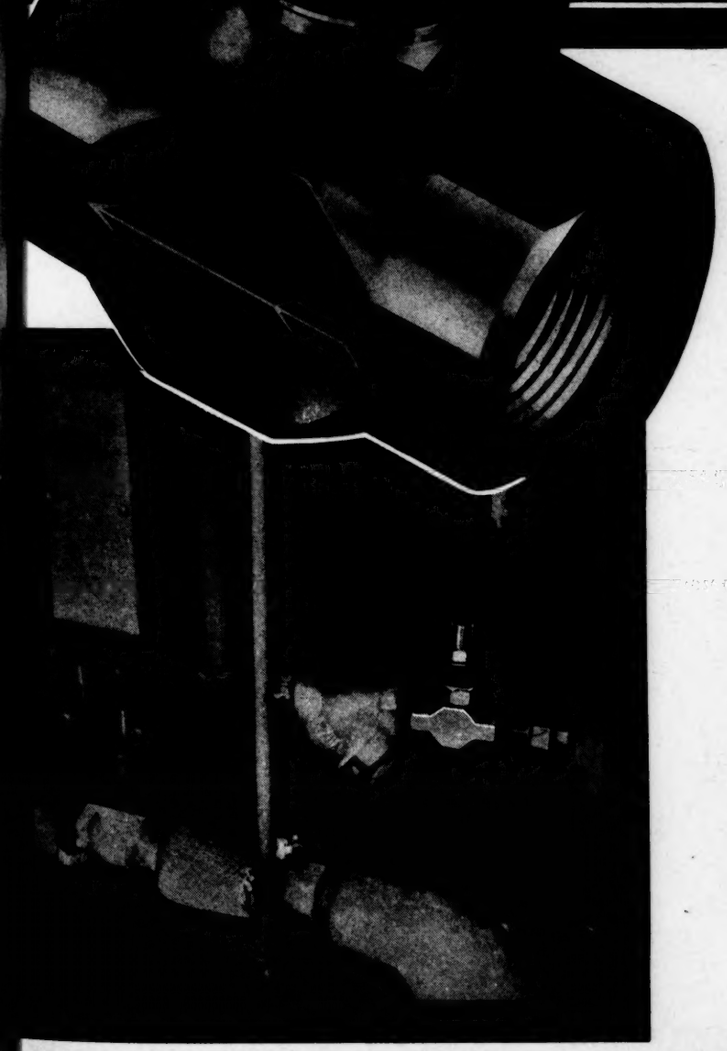
NAME—Murco unit heater.
PURPOSE—For supplying warm air using steam as a source of heat.
FEATURES—The heating elements in these unit heaters are constructed of copper tubes that are expanded into alloy cast-iron headers. The condenser is attached to the casing by a special spring support device so that the condenser is full floating to overcome contraction and expansion.
SIZES AND CAPACITIES—Twenty-five models with capacities ranging from 20,600 to 556,000 B.t.u. per hr. with air delivery of 430 to 8600 c.f.m.
MADE BY—*D. J. Murray Mfg. Co., Wausau, Wis.*



yarway IMPULSE TRAPS

In Largest Circular Knit Hosiery Mill*





Hanes Uses YARWAY TRAPS Exclusively on Hosiery Dryers

To get the greatest efficiency from their 34 latest type Proctor and Schwartz stocking dryers—the Hanes Hosiery Mills at Winston-Salem, N.C., installed 34 Yarway Impulse Steam Traps and Strainers.

A ¾ in. Yarway Impulse Trap and Strainer (see view at left) drains each dryer individually—keeps it clear of condensate and air permitting close temperature control.

Yarway Traps are a big help to operators of all kinds of steam equipment. They save valuable space, simplify installation and maintenance. And since their purchase price is usually less than the cost of repairing an old-type trap—why not get Yarway performance for your money?

See your supply house or write for Catalog T-1734.

YARNALL-WARING COMPANY
104 Mermaid Avenue Philadelphia

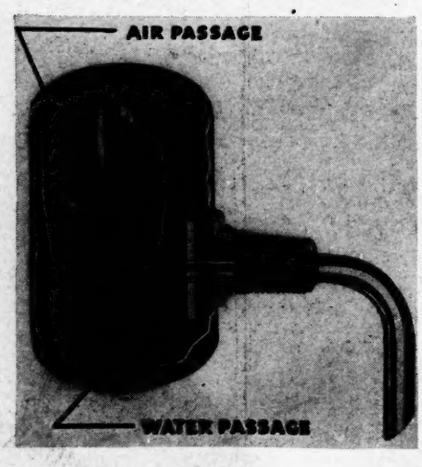
YARWAY IMPULSE STEAM TRAP

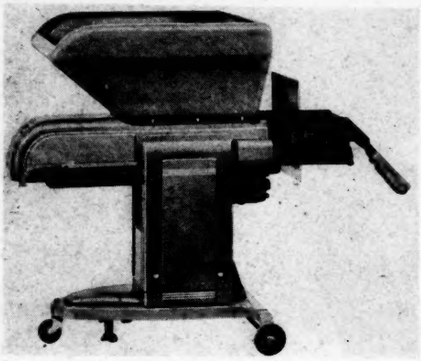
Lee Unit Heater

NAME—Lee suspended type unit heater.
PURPOSE—A high capacity suspended type gas-fired unit heater for use in large industrial buildings where high velocity heated air is desired to heat rooms of large floor area or high ceilings.
FEATURES—Unit will operate on natural gas, manufactured gas, or coke oven gas and is 3 ft. wide, 5 ft. long and 7 ft. high. It weighs about 3000 lb. and is of welded steel construction. The air discharge is 5500 c.f.m. with an average temperature rise of 110F. Air velocity at heater outlets is 2000 f.p.m.
CAPACITIES—500,000 B.t.u. per hr. output.
MADE BY—*Dravo Corp., Machinery Div., Pittsburgh, Pa.*

Raymond Vent Radiator Valve

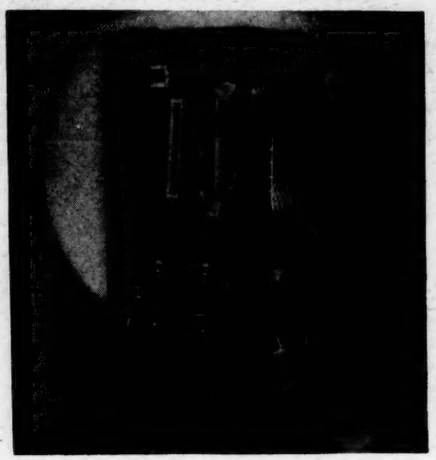
NAME—Raymond Dri-Vent radiator valve.
PURPOSE—For venting air from radiators.
FEATURES—Manufacturer states that valve vents from 50 to 100% more air than customary valves at low pressure without spitting any water at either high or low pressures. The valve is also said to meter and control the flow of air through it so that it gives the same venting rate at high pressures as it does at low pressures. Valve has inner and outer chambers with separate passages for air and water between the chambers. The lower passage is for water and is always closed by a water seal so that no bubbles of air can enter bottom of float chamber to cause spitting. The upper passage is for air and is restricted in size to cause a pressure drop. When the pressure in the radiator is more than 3 ounces, this pressure drop is sufficient to force water from the outer chamber into the float chamber through the water passage and thereby raise the float to throttle the vent port and maintain the venting rate constant at all pressures above 3 ounces. Valve is furnished in bright nickel finish which is similar to satin finish.
MADE BY—*F. I. Raymond Co., 629 W. Washington Blvd., Chicago, Ill.*





Murray Stoker

NAME AND MODEL NO.—Murray Electric Stoker, Model No. 40.
PURPOSE—For overfeed firing of boilers and furnaces using anthracite or bituminous coal or coke.
FEATURES—Unit consists of a hopper, fuel feeding mechanism and fuel control device all mounted in a portable unit. In operation the coal is fed automatically to the top of the fire. When a fuel cone reaches the proper level the automatic fuel control lever shuts off the stoker. When the fuel cone drops below a certain level the fuel control sets the stoker in action. Manufacturer states that stoker requires no expensive installation as it is simply necessary to roll it to the boiler, adjust to height of firing door and plug into a light socket. Stoker is furnished with necessary thermostat and controls.
MADE BY—*The Murray Corp. of America, 7700 Russell, Detroit, Mich.*

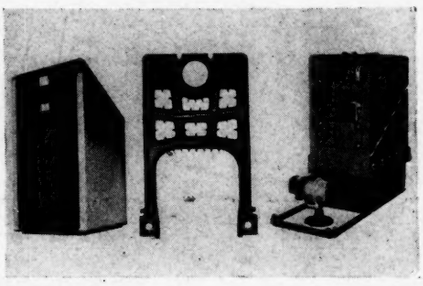


Basmor Warm Air Conditioners

NAME—Basmor gas fired, warm air furnace, Hi-model.
PURPOSE—For supplying warm humidified air using gas as a fuel.
FEATURES—This unit is designed particularly for applications where space is at a premium. It requires a minimum of floor space and can be installed in ventilated closets, behind partitions or in any other available space either on the same level with the space to be conditioned or in the space above. The unit will heat, humidify, clean, as well as circulate air.
SIZES AND CAPACITIES—Three sizes of capacity ranging from 52,000 to 144,000 B.t.u. per hour output at bonnet.
MADE BY—*Bastian-Morley Co., Inc., La Porte, Indiana.*
DISTRIBUTED BY—*Crane Co., Chicago, Ill.*

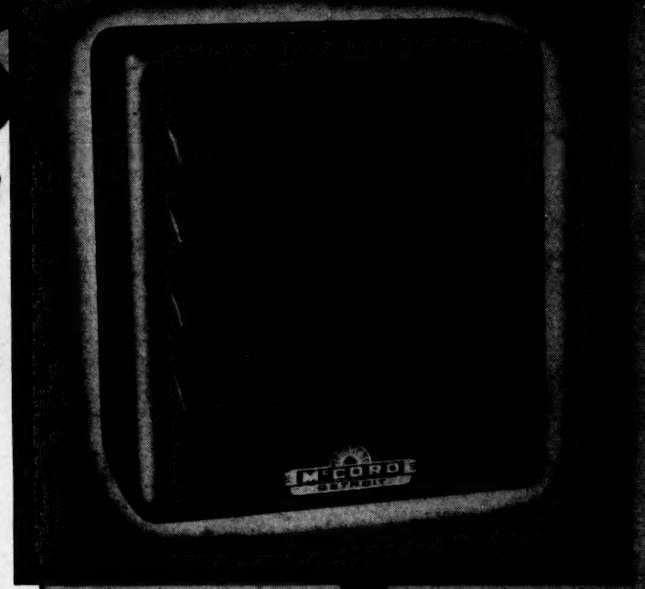
Utica Oil Burning Boiler

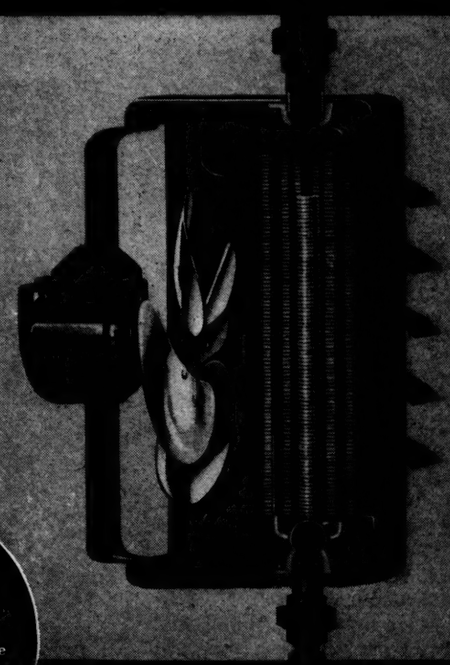
NAME AND MODEL NUMBER—Utica oil burning boiler, Series OB.
PURPOSE—For supplying steam or hot water utilizing oil as a fuel.
FEATURES—Boiler sections have finned surfaces. Controls are accessible for making electrical connections with the oil burner and the jacket is of the latest design and is so constructed that it is raised above the floor for easy cleaning and for protection from rusting at the edges where it customarily touches the floor.
MADE BY—*Utica Radiator Corp., Utica, N. Y.*



IMPROVED 1940 MODEL McCORD UNIT HEATERS

BETTER BUILT FOR BETTER SERVICE

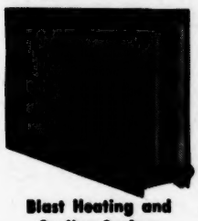




OTHER McCORD PRODUCTS

McCordair Streamlined Exhaust Fans

A new modern streamlined design with curved entrance fan ring. The latest development in balance, quietness, and efficiency in the movement of large volumes of air. Write for catalog.



Blast Heating and Cooling Surface

For use in forced air heating and cooling air conditioning systems. Convenient standard sizes. A new development in spirally wound fin tubes results in reduced air resistance and greater efficiency—for pressures 5-150 lbs.

Write for catalog on vertical projection unit heaters.

SOME DESIRABLE TERRITORIES OPEN FOR AGENTS

Agents interested in the McCord line are invited to write McCord —Detroit.

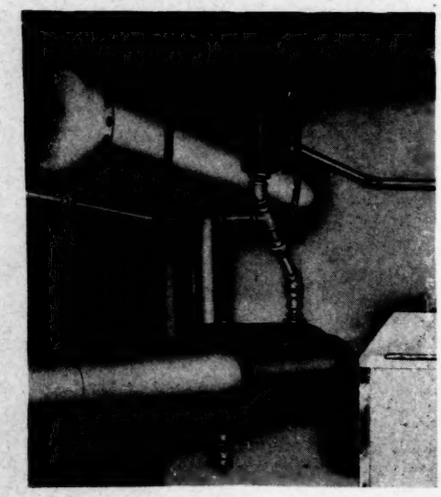
McCord RADIATOR & MFG. CO.
DETROIT • MICHIGAN

Automatic Unit Heaters

NAME—Automatic gas-fired unit heaters.
PURPOSE—For space heating using natural or manufactured gas or fuel.
FEATURES—Unit heaters feature an automatic flue which carries the products of combustion to the outdoors. Automatic flue consists of a motor and blower connected in such a way that when the heater starts to work the products of combustion are automatically discharged out of doors. Also included is a safety pilot which turns off the gas as the pilot goes out or burns too low to insure ignition.
SIZES AND CAPACITIES—Made in 5 sizes with a capacity range from 85,000 to 200,000 B.t.u. per hour.
MADE BY—*Automatic Gas-Steam Radiator Co., Pittsburgh, Pa.*

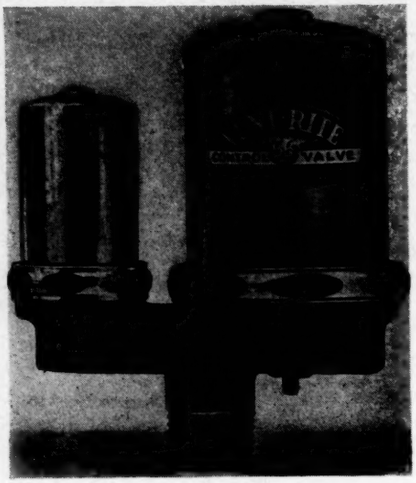
Harvey-Whipple Stack Water Heater

NAME—Master Kraft stack heat extractor.
PURPOSE—For supplying domestic hot water utilizing flue gas as a heat source.
FEATURES—Device consists of a water jacket with fins which extend inside the flue pipe. Fins extract heat from the flue gases and transfer it to the water in the jacket. This water circulates through an indirect heater which, in turn, heats the water in the storage tank.
CAPACITIES — The manufacturer states that the capacity of the unit when used on a gravity furnace equipped with a conversion oil burner or on a warm air conditioner is approximately equal to the capacity of a 40-gal. indirect heater on a steam job.
MADE BY—*Harvey-Whipple, Inc., Springfield, Mass.*



Anderson Vent Control Valve

NAME AND MODEL NUMBER — Vent-Rite control valve No. 66.
PURPOSE—For venting mains of one pipe steam heating systems and for controlling the vacuum.
FEATURES—The manufacturer states that this valve performs a triple duty.



(1) It replaces the standard main line vent, operating as a quick vent. (2) It returns the system to atmospheric pressure at the beginning of each firing period. (3) It limits the creation of vacuum to 10-in.
SIZES—4⅝ in. high by 3¾ in. wide. ½ in. I.P.T. thread.
MADE BY — *Anderson Products Inc., Cambridge, Mass.*

McCord Gas-Fired Unit Heater

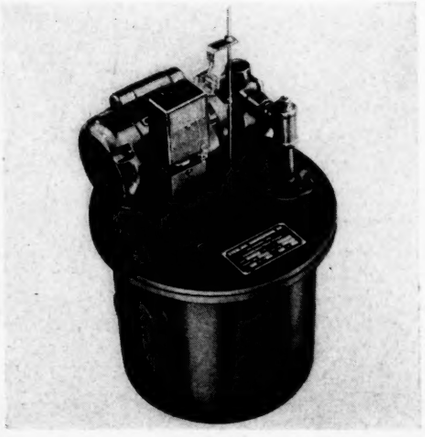
NAME—McCord gas-fired unit heater.
PURPOSE—For supplying warm air utilizing gas as a fuel.
FEATURES—The combustion chamber is equipped with a cast headsheet and deep flat tubes which are made of special material and designed to give maximum heating surface. Units are entirely self-contained and are equipped with controls for automatic operation.
SIZES AND CAPACITIES — Three sizes with capacities ranging from 63,000 to 150,000 B.t.u. per hr. input; air volumes from 1350 to 2250 c.f.m.
MADE BY—*McCord Radiator & Mfg. Co., Detroit, Mich.*

Conco Barometric Draft Control

NAME—Field draft control.
PURPOSE — For maintaining a constant draft on boilers and furnaces.
FEATURES — Control is made of heavy sheet metal and is equipped with side wings through which the gate moves closely. The gate itself is mounted off center to develop a greater effective area on which the draft can operate. The manufacturer states that a special axis mounting reduces friction and the need for oil. To lessen the possibility of the gate becoming warped or clogged with soot, the housing is extended to a point so that the gate does not swing into the flow of flue gases.
SIZES AND CAPACITIES—Available in seven standard sizes, 6 to 20 in.
MADE BY—*Conco Engineering Works, Division of H. D. Conkey & Co., Mendota, Ill.*

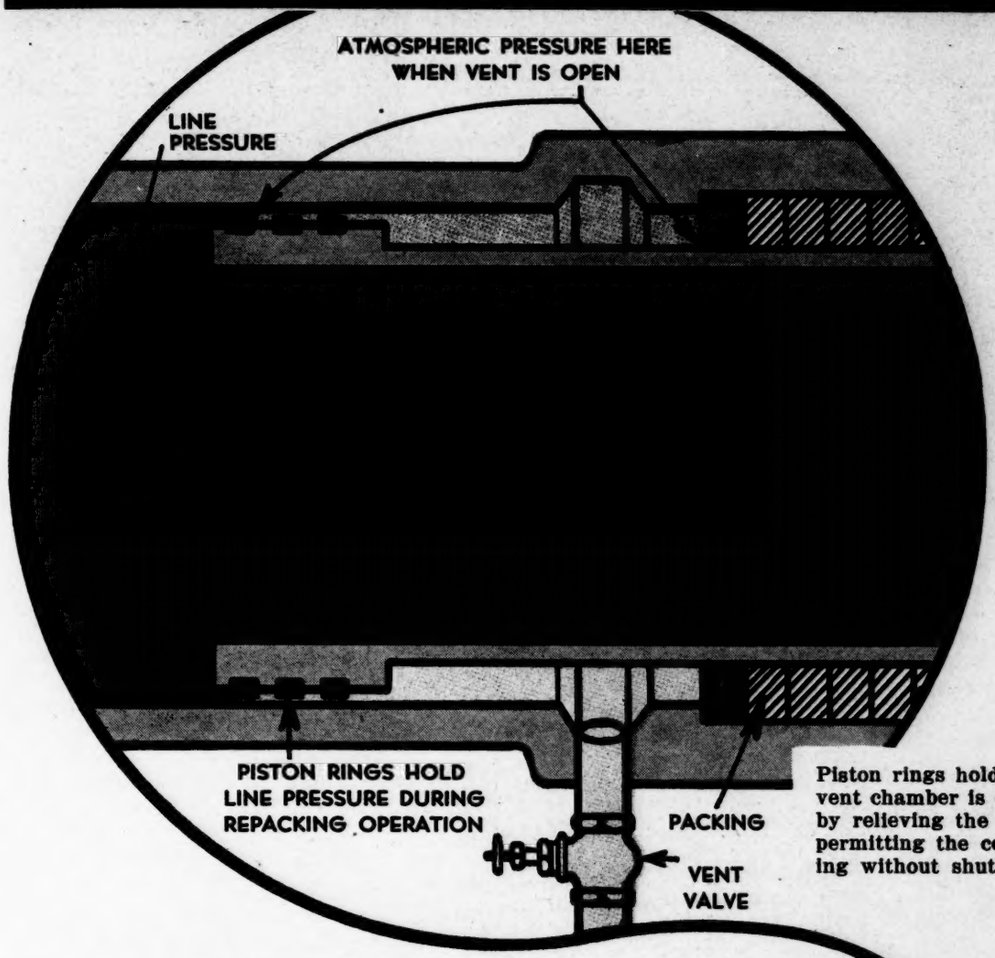
Sterling Condensation Pump

NAME—Sterling "Low Boy" condensation pump and receiver No. 4000.
PURPOSE—For collecting condensate from steam systems.
FEATURES—This is a low cost unit made up of a combination receiving tank and float switch control pump. It is constructed with a cast iron receiver and powered with a one-sixth hp., ball bearing, brushless motor. It is compactly designed and adaptable for installation either above or below ground.
CAPACITIES—1500 sq. ft. EDR at 30 lb. per sq. in. 3300 sq. ft. EDR at 10 lb. per sq. in.
MADE BY—*Sterling Engineering Company, Milwaukee, Wis.*



ADSCO PISTON-RING EXPANSION JOINT

Can be REPACKED UNDER PRESSURE without Service Interruption



Piston rings hold the line pressure when the vent chamber is opened to atmosphere, thereby relieving the stuffing box of all pressure, permitting the complete removal of all packing without shutting off steam.

The ONLY Slip Type Joint which Can be UNPACKED UNDER PRESSURE

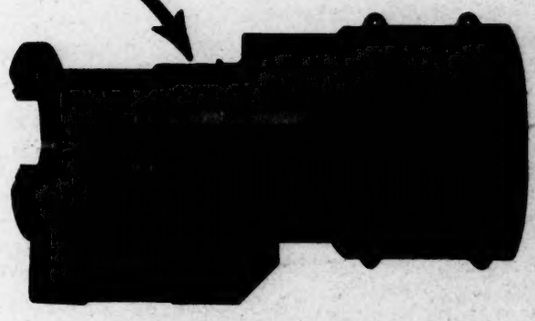
This exclusive piston ring feature enables you to remove ALL the packing and insert a complete set of NEW packing rings without interruption to service when infrequently necessary to repack this joint.

This is but the latest of many ADSCO improvements in slip type expansion joints during the past 60 years.

Equally important for dependable joint operation are these ADSCO features—correctly proportioned stuffing boxes; polished slips of time-tested material for ease of movement; positive limit stops to prevent overtravel of slip; practical internal and external guides for proper alignment and pressure fittings for replacing the lubricant in the packing, thereby keeping it pliable and prolonging its life.

You get all of these features in ADSCO Slip Type Expansion Joints at no price premium over comparable types of joints.

Write for ADSCO Catalog No. 35V.

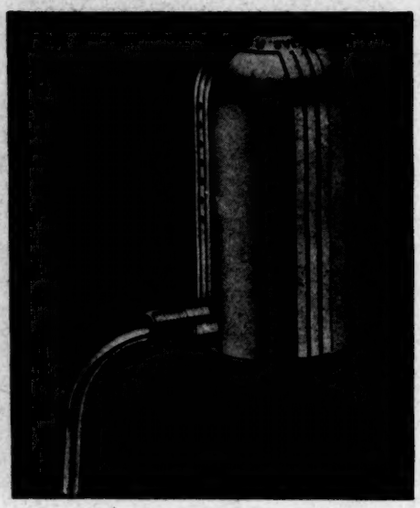


Available in various sizes for high pressures and high temperatures in single and double joints with or without base, flanged ends or with beveled ends for welding. Write for Bulletin No. 35-15A which illustrates and describes the ADSCO Piston-Ring Expansion Joint in detail.

AMERICAN DISTRICT STEAM COMPANY

NORTH TONAWANDA, N.Y.

IN BUSINESS OVER SIXTY YEARS

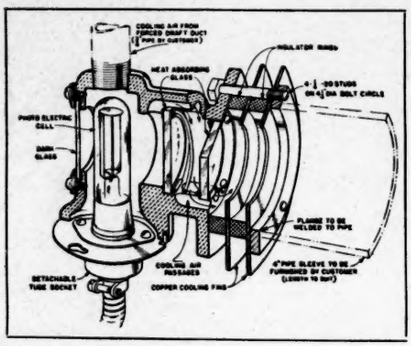


Marsh Automatic Air Valves

NAME AND MODEL NO.—Marsh Airliner Air Valves No. 1-1A and 2-2A.
PURPOSE—Venting steam radiators.
FEATURES—The manufacturer states that valves are silent in operation because vent air after leaving the vent port enters an outer chamber of the valve where its velocity is dissipated by expansion. From this outer chamber the air passes through multiple ports in the outer shell. Spraying is said to be eliminated by a baffle plate which deflects the spray into a float chamber. Spitting is said to be eliminated by a separate float chamber which is provided with small drainage ports. Valve No. 1 is a non-adjustable type while valve No. 1A has an adjustable venting. Valves No. 2 and 2A are of the vacuum type and have sensitive and powerful bellows for holding the vacuum. Valve No. 2 is of the non-adjustable type while valve No. 2A is of the adjustable venting type. All valves are furnished with a satin finish and highly polished ribs. Adjustable venting valves have a tamperproof vent adjustment which requires a screw-driver for adjustment.
SIZES—Valves are available in ⅛-in. angle pattern; ⅛ and ¼-in. straight pattern; ¾-in. male pattern and ⅜-in. IPS female pattern.
MADE BY—*Jas. P. Marsh Corporation, Chicago, Ill.*

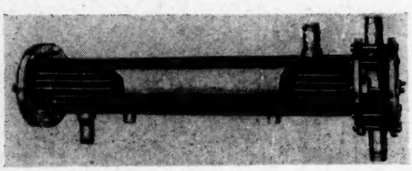
Bailey Flame Detector

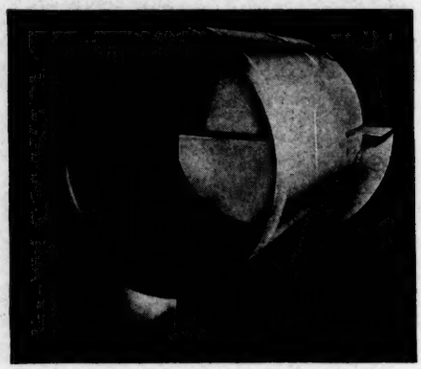
NAME—Bailey Flame Detector.
PURPOSE—For warning a boiler operator of possible furnace explosion which may result from loss of ignition.
FEATURES—Device consists of a light sensitive phototube unit within a special air-cooled housing which is mounted on the burner front or the boiler wall so that the phototube "sees" the flame at the point where ignition begins to take place. As long as the burner continues to maintain ignition, light from the flame reacts on the phototube causing it to have a low electrical resistance and thereby maintain a flow of current through a relay. In case of flame failure, the phototube resistance increases sharply so that the relay operates to close or to open contacts for sounding alarm. In addition to showing complete loss of ignition, the detector also indicates spotty or streaky flame resulting from intermittent or unsatisfactory fuel feed.
LITERATURE AVAILABLE—Bulletin No. 210.
MADE BY—*Bailey Meter Company, Cleveland, Ohio.*



Water Tube Boiler Oil Heater

NAME—Wa-Tu-Bo multipass straight tube oil heaters.
PURPOSE—For preheating fuel oils using steam or boiler water.
FEATURES—Heater consists of steel tubes expanded into steel tube sheets with the whole assembly welded in a steel shell. No internal gaskets or plugs are used and it is said that this eliminates the possibility of leaks. The headers are removable so that access can be had for cleaning, inspection or replacement of tubes. Heater is designed to use live steam at full boiler pressure when a final temperature of over 200F is required or to use low pressure or exhaust steam where lower temperatures are desired. Where the temperature of the oil need not be over 180F, boiler water can be circulated through the shell of the heater. The manufacturer states that no pipe connections need be broken to clean the inside of the heater.
SIZES AND CAPACITIES—Standard sizes available for heating from 16 to 310 gal. of oil per hr. from 80F to 150F with 212F boiler water. With steam the oil can be heated 100F in quantities of from 16 to 1377 g.p.h. depending on steam pressure. Larger size heaters are available.
MADE BY—*Water Tube Boiler & Tank Co., Inc., 1211 E. 73; Chicago, Ill.*





Titusville Combustion Chamber

NAME—Ti-Glow oil combustion chamber.
PURPOSE—A permanent type combustion chamber designed to bring the furnace temperature instantly to the point where complete combustion takes place and at the same time retard the exit of hot gases until they have given up their heat.
FEATURES—This combustion chamber is made of a chrome alloy which is said to resist corrosion and the effects of high temperature. The manufacturer states that the use of such a furnace lining will increase combustion efficiency. It is also said that the time for labor of installation, testing, maintenance of brick combustion chambers will be eliminated.
MADE BY—*The Titusville Iron Works Co., Titusville, Pa.*

Anchor Boiler

NAME AND MODEL NUMBER—Fluid heat boiler, model WB-2.
PURPOSE—For heating small buildings, for supplying domestic hot water or both.
FEATURES—Boiler walls are made of 12 gage steel with heavy steel used for the heads. In the center flue is a 1-in. copper coil which serves as an exchanger and flue baffle and gives the effectiveness of extended and water backed surfaces. A built-in combustion chamber extends the full height of the boiler base. A drain valve for flushing boiler and coil assembly is provided. An indirect domestic hot water heater can be externally connected to the boiler flow and return piping at the boiler. Standard equipment includes flange-mounted P-3C Fluid Heat oil burner, primary control, room thermostat, and limit control. Boiler is designed for 150 lb. working pressure. It is shipped completely assembled in a green jacket with insulation extending the full length of the boiler.
CAPACITY—Ranges from 475 to 785 EDR hot water depending upon oil burner nozzle size.
MADE BY—*Fluid Heat Div. of Anchor Post Fence Co., Baltimore, Md.*

SUM

COOLING AND

Looking for Pipe you can Bend?

Then use NATIONAL *Refrigeration Pipe*

...here's **PROOF!**

THE makers of this evaporative condenser, in order to pack maximum capacity within minimum space, had to have a pipe that would bend successfully, without tendency to buckle, flatten, or split. They chose NATIONAL Refrigeration Pipe. Here is the result: a condenser coil consisting of more than half a mile of pipe, providing 1,150 square feet of surface for heat transfer, within a space 8′ long by 6′ wide by 4′ deep.

It takes good pipe to turn out jobs like this. It takes ductile pipe that is clean, free of flaws and inclusions . . . pipe of moderate cost, that will give trouble-free service. NATIONAL Refrigeration Pipe offers all these qualities rolled into one. That's why it is the world's most widely used refrigeration pipe. Use it wherever you need pipe that works easily, resists corrosion, reduces spoilage, gives long, dependable service. It protects more fruit, vegetables, and dairy products than any other pipe.

Atmospheric evaporative condenser recently installed in a well-known department store in New York City. Unit contains 2650 feet of 1¼-inch NATIONAL Refrigeration Pipe. This construction required 300 U-bends, 3¾ inches center to center. Jobs like this show why National is the world's leading pipe for refrigeration and air-conditioning service.

REFRIGERATION ENGINEERS:
Write for this book. A valuable collection of practical facts on refrigeration piping, containing 48 pages of pictures, drawings, tables, and charts, all indexed for easy reference.

NATIONAL TUBE COMPANY

PITTSBURGH, PA.

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Export Company, New York, *Export Distributors*

UNITED STATES STEEL

Market Trends Toward Smaller Capacity Jobs in Commercial Buildings; Sales Up Slightly

THERE is still confusion regarding what is meant by the summer functions. The attitude has been taken in preparing material for this section that a summer plant is one capable of cooling or dehumidifying or both. This is the same attitude which has been followed in preparing material for previous issues of the Yearbook of Progress.

Perhaps the most generally interesting point in connection with the year's activities is the fact that, judging by the best available data, dollar volume of equipment sales for summer plants was approximately the same as during 1938. Thus sales of this equipment failed to increase with the large expansion in the total volume of new building construction, which, however, was largely devoted to the building of residences. Again, as in previous years, few of the new residences constructed during the year made any provision for cooling beyond use of insulation or awnings or ventilation with night air.

The year was also marked by a generally increased acceptance of the self-contained unit. At the same time there was a trend toward much smaller average refrigeration capacity per installation. In such a situation the self-contained units are much more attractive than when much of the volume was installed in large capacity units. It is also evident that the self-contained unit has not been developed to its fullest possibilities, and also that it is meeting the expectations of its advocates in greatly simplifying the installation and service problems.

A good deal of selectivity has been necessary in choosing topics for inclusion in this section. Many developments of some interest have had to be wholly excluded because of lack of space.

It seems well to repeat again the point made in earlier issues of the Yearbook of Progress that the time has not yet arrived when anyone who is engaged in the practice of air conditioning should close his mind to what is going on. Developments are still taking place rapidly in many directions. Methods, processes, and equipment are far from standardized and it is the part of wisdom not to let thinking become too standardized either. Again it is suggested that an attitude of open mindedness should be maintained regarding what is going on in connection with the cooling of air.

Cooling in Hospitals

Operating rooms in hospitals appear to be the place where air cooling is first applied. Over 300 hospitals can be identified as making use of air cooling or conditioning somewhere on the premises and in the great majority of these it is confined to operating rooms. Some hospitals have arrangements whereby portable equipment can be made available in patients' rooms where considered necessary or desirable. Others have followed the practice of equipping a few rooms with permanent apparatus and using these rooms for the accommodation of patients whose cases seem to call for it. Rooms for special therapy requiring air conditioning are fairly common. There are very few hospitals where all spaces are cooled. These few include some which are experimental and are being operated to secure added knowledge regarding the ultimate place and usefulness of air conditioning in hospitals. Reports indicate that during the year air cooling was installed in the operating rooms of several hospitals in tropical countries.

No data appeared during the year indicating that the methods or the standards of performance in operating rooms, or in hospitals generally, underwent any important changes. It can be concluded that these points are now well enough settled so that the present installations are generally considered suitable for their purpose by those who use them. It is believed that all that holds up a much wider use of air conditioning in operating rooms is a lack of money with which to go ahead. The matter of adoption of air cooling or conditioning throughout hospital buildings is much more open to question, with no clearcut indication that those who are in charge of hospitals have made up their minds.

One of the most active practitioners in studying the uses of hospital air conditioning is Dr. A. G. Young who is connected with Corey Hill Hospital in Brookline, Mass., where there is a plant well adapted to purposes of study. (For description see HEATING & VENTILATING for February, 1937.) During the year Dr. Young stated that, at Corey Hill, post-operative pneumonia has been greatly reduced below the national average, and that the rate of post-operative mortality at Corey Hill is also well below the figures usually found where patients are not kept in air conditioned rooms following operations. The Infants Hospital in Boston reported a most striking reduction in mortality of premature infants when they were kept in air conditioned nurseries.

Enough progress is made each year in connection with broadening the scope of using air conditioning for treating human ailments so that it can be safely predicted that ultimately these uses may overshadow all others. As an actual source of present business, hospitals are still in the minor brackets.

Looking for Pipe you can Bend?

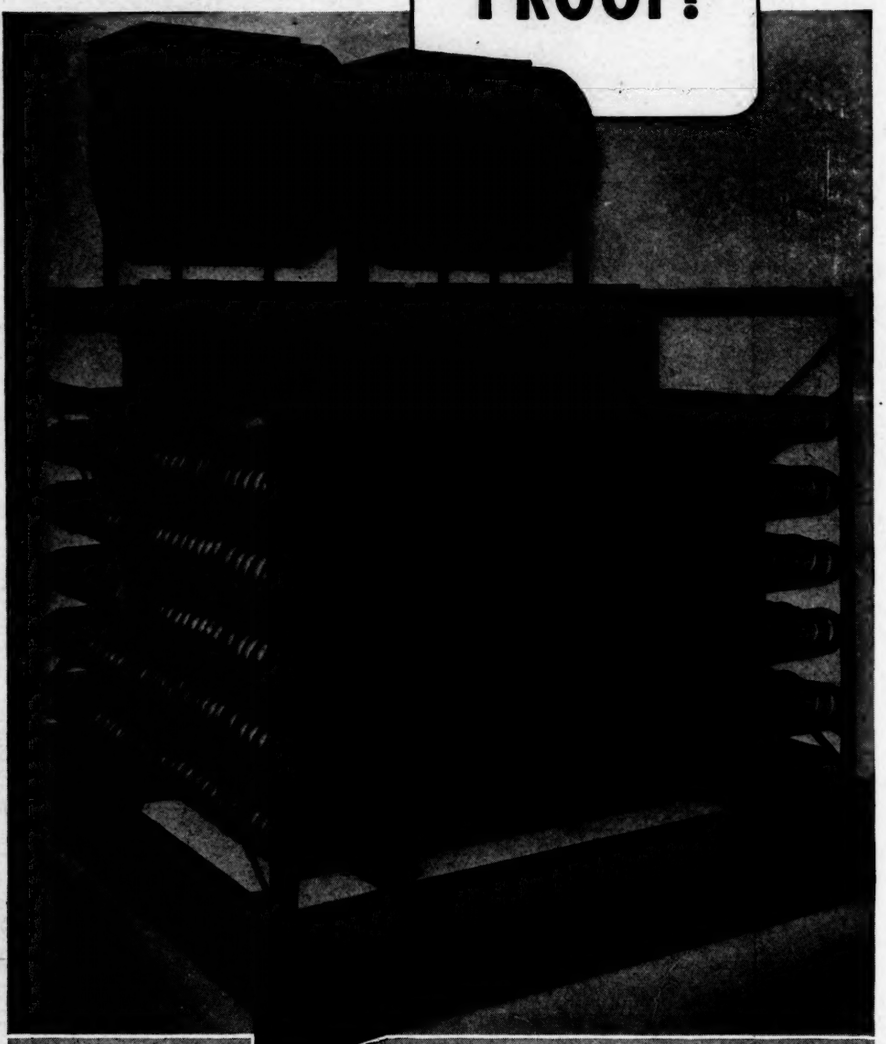
Then use NATIONAL *Refrigeration Pipe*

...here's **PROOF!**

THE makers of this evaporative condenser, in order to pack maximum capacity within minimum space, had to have a pipe that would bend successfully, without tendency to buckle, flatten, or split. They chose NATIONAL Refrigeration Pipe. Here is the result: a condenser coil consisting of more than half a mile of pipe, providing 1,150 square feet of surface for heat transfer, within a space 8′ long by 6′ wide by 4′ deep.

It takes good pipe to turn out jobs like this. It takes ductile pipe that is clean, free of flaws and inclusions . . . pipe of moderate cost, that will give trouble-free service. NATIONAL Refrigeration Pipe offers all these qualities rolled into one. That's why it is the world's most widely used refrigeration pipe. Use it wherever you need pipe that works easily, resists corrosion, reduces spoilage, gives long, dependable service. It protects more fruit, vegetables, and dairy products than any other pipe.

REFRIGERATION ENGINEERS:
Write for this book. A valuable collection of practical facts on refrigeration piping, containing 48 pages of pictures, drawings, tables, and charts, all indexed for easy reference.



Atmospheric evaporative condenser recently installed in a well-known department store in New York City. Unit contains 2650 feet of 1¼-inch NATIONAL Refrigeration Pipe. This construction required 300 U-bends, 3¾ inches center to center. Jobs like this show why National is the world's leading pipe for refrigeration and air-conditioning service.

NATIONAL TUBE COMPANY

PITTSBURGH, PA.

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Export Company, New York, *Export Distributors*

UNITED STATES STEEL

Market Trends Toward Smaller Capacity Jobs in Commercial Buildings; Sales Up Slightly

THERE is still confusion regarding what is meant by the summer functions. The attitude has been taken in preparing material for this section that a summer plant is one capable of cooling or dehumidifying or both. This is the same attitude which has been followed in preparing material for previous issues of the Yearbook of Progress.

Perhaps the most generally interesting point in connection with the year's activities is the fact that, judging by the best available data, dollar volume of equipment sales for summer plants was approximately the same as during 1938. Thus sales of this equipment failed to increase with the large expansion in the total volume of new building construction, which, however, was largely devoted to the building of residences. Again, as in previous years, few of the new residences constructed during the year made any provision for cooling beyond use of insulation or awnings or ventilation with night air.

The year was also marked by a generally increased acceptance of the self-contained unit. At the same time there was a trend toward much smaller average refrigeration capacity per installation. In such a situation the self-contained units are much more attractive than when much of the volume was installed in large capacity units. It is also evident that the self-contained unit has not been developed to its fullest possibilities, and also that it is meeting the expectations of its advocates in greatly simplifying the installation and service problems.

A good deal of selectivity has been necessary in choosing topics for inclusion in this section. Many developments of some interest have had to be wholly excluded because of lack of space.

It seems well to repeat again the point made in earlier issues of the Yearbook of Progress that the time has not yet arrived when anyone who is engaged in the practice of air conditioning should close his mind to what is going on. Developments are still taking place rapidly in many directions. Methods, processes, and equipment are far from standardized and it is the part of wisdom not to let thinking become too standardized either. Again it is suggested that an attitude of open mindedness should be maintained regarding what is going on in connection with the cooling of air.

Cooling in Hospitals

Operating rooms in hospitals appear to be the place where air cooling is first applied. Over 300 hospitals can be identified as making use of air cooling or conditioning somewhere on the premises and in the great majority of these it is confined to operating rooms. Some hospitals have arrangements whereby portable equipment can be made available in patients' rooms where considered necessary or desirable. Others have followed the practice of equipping a few rooms with permanent apparatus and using these rooms for the accommodation of patients whose cases seem to call for it. Rooms for special therapy requiring air conditioning are fairly common. There are very few hospitals where all spaces are cooled. These few include some which are experimental and are being operated to secure added knowledge regarding the ultimate place and usefulness of air conditioning in hospitals. Reports indicate that during the year air cooling was installed in the operating rooms of several hospitals in tropical countries.

No data appeared during the year indicating that the methods or the standards of performance in operating rooms, or in hospitals generally, underwent any important changes. It can be concluded that these points are now well enough settled so that the present installations are generally considered suitable for their purpose by those who use them. It is believed that all that holds up a much wider use of air conditioning in operating rooms is a lack of money with which to go ahead. The matter of adoption of air cooling or conditioning throughout hospital buildings is much more open to question, with no clearcut indication that those who are in charge of hospitals have made up their minds.

One of the most active practitioners in studying the uses of hospital air conditioning is Dr. A. G. Young who is connected with Corey Hill Hospital in Brookline, Mass., where there is a plant well adapted to purposes of study. (For description see HEATING & VENTILATING for February, 1937.) During the year Dr. Young stated that, at Corey Hill, post-operative pneumonia has been greatly reduced below the national average, and that the rate of post-operative mortality at Corey Hill is also well below the figures usually found where patients are not kept in air conditioned rooms following operations. The Infants Hospital in Boston reported a most striking reduction in mortality of premature infants when they were kept in air conditioned nurseries.

Enough progress is made each year in connection with broadening the scope of using air conditioning for treating human ailments so that it can be safely predicted that ultimately these uses may overshadow all others. As an actual source of present business, hospitals are still in the minor brackets.

SUMMER EQUIPMENT SALES STATISTICS

31 Air Conditioning Units
Self-Cont., Under 1 hp.; Orders

	1936	1937	1938	1939
Jan				$38,407
Feb				20,430
Mar				88,298
Apr				248,336
May				202,501
Jun		No Data		418,805
Jul				188,434
Aug				66,947
Sep				32,499
Oct				—
Nov				—
Dec				—
Yr				—

32 Air Conditioning Units
Self-Contained, 1-5 hp., Orders

	1936	1937	1938	1939
Jan				$30,774
Feb				81,791
Mar				102,088
Apr				300,640
May				343,443
Jun		No Data		384,901
Jul				242,612
Aug				107,965
Sept				44,125
Oct				—
Nov				—
Dec				—
Yr				—

33 Air Conditioning Units
Self-Cont., Over 5 hp.; Orders

	1936	1937	1938	1939
Jan				$4,019
Feb				13,226
Mar				15,709
Apr				84,853
May				133,417
Jun		No Data		127,013
Jul				83,307
Aug				121,160
Sep				35,036
Oct				—
Nov				—
Dec				—
Yr				—

34 Air Conditioning Units†
Self-Contained, Total; Orders

	1936	1937	1938	1939
Jan				$73,200
Feb				115,447
Mar				206,095
Apr				633,829
May				679,361
Jun		No Data		930,719
Jul				514,353
Aug				296,072
Sep				111,660
Oct				—
Nov				—
Dec				—
Yr				—

†Totals of Tables 31 to 33, incl.

35 Air Conditioning Units†
Non-Self-Contained; Orders

	1936	1937	1938	1939
Jan				$70,348
Feb				49,591
Mar				137,561
Apr				116,930
May				215,470
Jun		No Data		118,321
Jul				61,299
Aug				60,503
Sep				67,955
Oct				—
Nov				—
Dec				—
Yr				—

†Excluding refrigeration

36 Air Conditioning Units†
All Types; Orders

	1936	1937	1938	1939
Jan				$143,548
Feb				164,738
Mar				343,656
Apr				750,759
May				894,831
Jun		No Data		1,049,040
Jul				575,652
Aug				356,575
Sep				179,615
Oct				—
Nov				—
Dec				—
Yr				—

†Totals of Tables 34 and 35

37 Air Conditioning Systems†
Orders, Incl. Labor, Com. Plants

	1936	1937	1938	1939
Jan				$198,829
Feb				460,711
Mar				630,721
Apr				495,188
May				224,503
Jun		No Data		328,508
Jul				167,828
Aug				189,757
Sep				198,517
Oct				—
Nov				—
Dec				—
Yr				—

†Central comfort systems for summer use

38 Air Conditioning Systems†
Orders, Incl. Labor, Ind. Plants

	1936	1937	1938	1939
Jan				$9,494
Feb				57,222
Mar				6,532
Apr				33,760
May				38,271
Jun		No Data		7,475
Jul				16,511
Aug				3,656
Sep				8,621
Oct				—
Nov				—
Dec				—
Yr				—

†Central industrial systems for summer use

39 Air Conditioning Systems†
Total, Orders

	1936	1937	1938	1939
Jan				$208,323
Feb				517,933
Mar				637,253
Apr				528,948
May				262,774
Jun		No Data		335,983
Jul				184,339
Aug				193,413
Sep				207,138
Oct				—
Nov				—
Dec				—
Yr				—

†Total from Tables 37 and 38 of central summer systems

40 Shell and Tube Condensers
Orders

	1936	1937	1938	1939
Jan				$16,716
Feb				25,660
Mar				9,970
Apr				10,268
May				8,004
Jun		No Data		3,356
Jul				1,689
Aug				6,454
Sep				1,531
Oct				—
Nov				—
Dec				—
Yr				—

41 Evaporative Condensers
Orders

	1936	1937	1938	1939
Jan				$39,997
Feb				40,089
Mar				98,730
Apr				23,220
May				28,745
Jun		No Data		22,900
Jul				16,669
Aug				28,262
Sep				26,734
Oct				—
Nov				—
Dec				—
Yr				—

42 Direct Expansion Coils
Orders

	1936	1937	1938	1939
Jan				$78,970
Feb				68,521
Mar				119,824
Apr				184,662
May				183,111
Jun		No Data		218,313
Jul				193,353
Aug				131,648
Sep				201,871
Oct				—
Nov				—
Dec				—
Yr				—

Frozen Sleep

Of interest because it made the headlines during the year was the attempt to develop the *frozen sleep* technique. This consists of lowering the body temperature into the eighties and keeping the patient in this condition for some time. During such a period many of the normal body functions are greatly slowed or even stop altogether. It is hoped that this lowering of temperature may result in some new approaches to methods of treating certain diseases. The idea is still experimental, has been used in but a few places and on but a small number of patients. No conclusions are justified as yet as to what its possibilities may be. The equipment is also under development. The first applications are reported to have consisted of applying blocks of ice directly to the skin of the patient. Later reports indicate use of a cabinet or box into which the patient is put and in which the air temperature is lowered.

Results of Air Cooling

During the year efforts were made to collect information showing to what extent air conditioning could be shown to have increased employee efficiency or to have reduced absenteeism due to the common causes such as colds. This had to be done by collecting records gathered by the owners and operators of air conditioning plants. Important industrial and commercial owners in a few instances were able to show numerical results over long enough periods of operation to produce impressive figures. The findings indicated reduction of absenteeism of from 5 to 50% with considerable year to year variation. Other users made no attempt to arrive at numerical results due to absence of definite records but did report that air cooling had been of definite value to them. As time goes on it can be expected that emphasis on air conditioning may be expected to shift toward production of proof of benefits and away from such questions as design and operating conditions to be maintained.

Cooling in Residences

So far as sales are concerned the year saw little progress in penetrating the potential market in existing residences with the mechanical refrigeration equipment now available. In fact, what evidence there is—and it is far from complete—indicates that dollar sales of refrigeration equipment for residence cooling actually decreased in 1939 as compared to 1938.

It is becoming increasingly apparent that installation of mechanical cooling equipment in residences is confined almost entirely to the hotter cities; that penetration of this market is very spotty; and that there is still little evidence that home owners or prospective home builders are more than mildly interested in putting mechanical cooling into their houses in the North and West. As has been true for the past ten years, however, the feeling still persists that eventually residences are going to offer a huge market for mechanical refrigeration cooling equipment, although it is increasingly apparent with each year that few people have great hopes of a large volume of air cooling business in private residences in the immediate future.

There is still no indication as to what the eventual cooling methods and equipment adapted for residences are to be. One large and influential school of thought in the industry holds to the belief that the use of attic fans, awnings, and good insulation will provide a satisfactory degree of cooling in the large and important population centers. So far as can be determined these are the methods which are gaining in preference in a good many localities year by year. Another belief is that the small self-contained room units will eventually prove to be the equipment which will appeal to the residence market in volume. Still another belief is that the final solution will be through some plan whereby the same fuel used for winter heating can be adapted, through the absorption cycle of refrigeration, to cooling buildings in summer. What equipment developments took place during the year largely had to do with attempts to work out methods and equipment for this process.

While most of the important facts regarding the statistical picture of residence cooling have been well at hand, still a good deal of additional light was shed on this during the year by a report of the Edison Electric Institute, which appeared under the title "Air Conditioning Installations," in September. This report, compiled from data submitted by 141 electric utility companies throughout the country, indicates that there are about 7400 installations of air cooling by mechanical refrigeration in private homes and having a total connected horsepower of somewhat over 14,000. This indicates that as a general average a connected load of just about 2 hp. appears to be sufficient per residence. Analysis of the individual figures from some of the more important cities for which reports are at hand indicate that the average size of installation varies from 5 or 6 hp. in some of the cities in the Southwest to from 3/10 to 5/10 hp. in some of the Northern cities and in the cities where evaporative cooling is practiced.

It is also of interest to note that of the 7400 installations listed in the utility report, over 2000 are reported from five cities, namely, St. Louis, Kansas City, Oklahoma City, Tulsa and Cincinnati. Illustrative of how greatly these existing installations are concentrated in a few localities is the fact that of the 7400 reported nearly 3100 or 42% are concentrated in only ten cities, namely, St. Louis, Kansas City, Oklahoma City, Tulsa, Cincinnati, Houston, Dallas, Philadelphia, Baltimore, and Riverside, Cal.

The data included in the electric utility report also permit a study of the present penetration of the residence market. If the figures given in the report are calculated to show the number of horsepower of connected load per 10,000 population served by the utility company, the resulting figure is at least a rough index of the extent to which the residence air cooling load has been connected to date. When this is done it is found that in the cities of the South and Southwest including Tulsa, Kansas City, Omaha, Dallas, Houston and Ft. Worth, all show a penetration of air conditioning load of an order ten to twenty times the figure indicated for the large eastern and north middle western cities. In other words, sales efforts to date have

succeeded in penetrating the residence market to at least ten times the extent in the Southwest cities as has been done in most of the other large cities. It is interesting to note that the New York and Chicago Metropolitan areas generally are among the ones in which extremely small progress has been made in penetrating the residence market for cooling with existing refrigeration equipment. It is believed that this difference in penetration is due to better demand for cooling in Southwest cities rather than to any more highly developed sales methods used there.

Apartment House Cooling

Use of mechanical refrigeration for air cooling in apartment houses is still very much restricted to a few cities and there are but few such installations. Large capacity fans for location in the individual apartment and window fan-and-filter boxes have been used to some extent. A large suburban garden-type apartment near New York was reported to have been cooled with a central ice melting tank as the source of chilled water. Insulation of roofs, use of attic fans, and use of water sprays on the roof are all practiced in apartment house cooling to some extent. Generally these methods, or combinations of them, are the ones selected for apartment cooling in preference to mechanical refrigeration. An electric utility report indicates that early in 1939 there were about 1800 tons of mechanical refrigeration in use for cooling air in 60 apartment houses in some 20 large cities. By far the greater part of this was concentrated in Washington with 500 hp. of connected load in four apartment houses, New York with 455 hp. in three apartment buildings, St. Louis with 330 hp. in 13, and Dallas with 93 hp. in five.

In the July, 1939, issue of HEATING & VENTILATING were descriptions of how the cooling plants were arranged in one of the large Washington houses and in a high-class, large apartment building in New York. The methods described there may be taken as representing the most recent practice in apartment house cooling. This same issue also included an example of how large capacity fans are used to obtain limited cooling in this type of building.

There is still no agreement as to how large a potential market for cooling there may be in the apartment house. Generally the equipment is the same or similar to that used in residence cooling and it seems evident that the cooling of apartment living quarters can be expected to advance or stand still to about the same extent as obtains in private, detached houses.

Cooling in Retail Stores

Certain specialty shops were among the early users of air cooling in retail stores. They started something of a trend, for retail shops and stores have been among the important commercial users of cooling for some time. Estimates as to how extensive is this trend are difficult because of lack of information but in November *Chain Store Age* reported that returns from a survey indicated a 1939 expenditure of $7,500,000 by retail chains. The chains represent an important part, although not all, of the retail stores in which air cooling was installed during the year. This survey showed that, compared to 1938, the chain store expenditure for air cooling was about 8.2% less in 1939. It also indicated that by the end of 1938 nearly 30% of the drug stores owned by the reporting chains were cooled, over 21% of the chain restaurants, nearly 17% of the apparel chains, and 13.6% of the stores of the shoe chains. Grocery chain stores seem to have shown little tendency to install air cooling, although with the rising popularity of super-markets it is expected that these stores will indicate more interest soon.

Additional statistical information on the extent to which air cooling has been adopted by retail stores is included in a report of electric utility companies which indicates that nearly 4800 such stores were on the lines of the reporting utilities early in the year. This is in addition to nearly 3300 restaurant installations also reported.

Opinions as to the immediate future trends in retail store cooling are diverse. Some in the industry believe that the cream has been taken and that hereafter the installations in these stores will vary with activity in new store building construction because many retail stores have either already completed their alteration and modernizing program involving air cooling or else are prevented from carrying out such programs at present. Others point to the undoubtedly large number of retail stores still not cooled and are confident that these stores will steadily install cooling equipment, especially with the appeal of the self-contained unit for such businesses.

Vehicle Cooling

Cooling of railway passenger cars continued with reports indicating that over 650 such cars were cooled during the year. This compares with nearly 1400 in 1938 and with about 3400 during 1935 when the program of the railroads was at its height. The total reported for 1939 is about the same as the number reported cooled during 1933 when the railway cooling programs were just getting under way. Information believed reliable indicates that nearly all the Pullman cars are now supplied with cooling and that most of the passenger cars which the Class I roads intend to cool have already been completed. It is anticipated that hereafter cooling of railway passenger cars will be installed when the cars are built and that there will be little put into existing cars. No innovations in methods or equipment were reported. It seems generally agreed that the operating experience of the railroads with air cooled cars has been good and that public reaction continues favorable.

No changes were reported in the situation surrounding cooling of short run and suburban cars. Generally these are not cooled or are cooled only before the run. The same continues to apply to airplane cabins. At the year-end there were no indications that further cooling will be generally practiced in such vehicles in the immediate future.

Cooling for buses received considerable impetus during 1938 and some of this carried over into 1939 but no general program materialized for cooling existing

buses. Estimates of the number of cooled buses now operating are not reliable but reports from the automotive industry indicate that there may be as many as 400 cooled buses operating on regular runs, the greater part of which are in the Southwest and are on relatively long runs. It is not clear as yet what the attitude of operating companies toward cooling is to be.

With the appearance of the 1940 automobiles came the announcement that one car manufacturer would make a complete mechanical refrigeration cooling equipment available as a standard, factory-installed, extra-cost accessory. Reportedly the extra cost is about $250 installed. So far as known this is the first instance when this kind of unit has been offered by any of the automobile manufacturers. Appearance of such an accessory has been foreshadowed for some time and confidently predicted. Because of the possible important effects on the whole air conditioning situation if such a unit should strike popular fancy, the new accessory will be watched with much interest.

Principal features are shown in the accompanying diagram. It will be seen that both the heating and cooling coils are at the back of the car body. The condenser and compressor are at the front with the compressor mounted on the engine block and driven by a belt from the fan pulley. Air is delivered at the back of the car and directed upward and forward, returning along the floor to the return air intake under the back seat. Operation is under control of the driver by starting and stopping the blower. Information furnished by the automobile manufacturer shows a cooling capacity of 1½ tons at 60 m.p.h. and 2 tons at 80 m.p.h.

Utility Statistical Report

Late in the year a report "Air Conditioning Installations," prepared by the Air Conditioning Committee of Edison Electric Institute, appeared. It presented statistical information on the extent of the connected load for air cooling purposes up to early 1939 as gathered by 141 electric utility companies. The whole load included in this report thus represents a large fraction of that installed to date since the operations of the 141 utility companies cover a large part of the country and include all the larger cities and their suburban areas. In this connection it should be kept in mind that by far the greater part—probably over 90%—of the installed air cooling equipment using mechanical refrigeration has been powered by electric energy and most of it has been served by utility companies. The accompanying Table I is a summing up of the report.

If we take this record of over 770,000 hp. on the service lines of 141 electric utilities early in 1939, if we allow for the connected load installed during the remainder of 1939, also allow for the load on service lines of other electric utilities, for the load powered directly by steam, oil and gas, and therefore not reported to electric utilities, it is concludable that the whole connected load of the country's air conditioning and cooling in buildings and in industrial process work is not less than 1,000,000 hp. at the beginning of 1940. As this figure checks against other methods of total load estimating it is believed to represent the present load closely.

One point should be carefully noted on Table I. The utility report mentioned shows 16,851 installations in residential apartments and private homes with a connected load of 17,210.8 hp. Examination of the detailed reports, however, leads to the belief that a total number of 7400 and a connected load of 14,100 hp. would more nearly represent a uniform method of reporting.

Another point to be kept in mind in interpreting Table I is that the total connected horsepower in in-

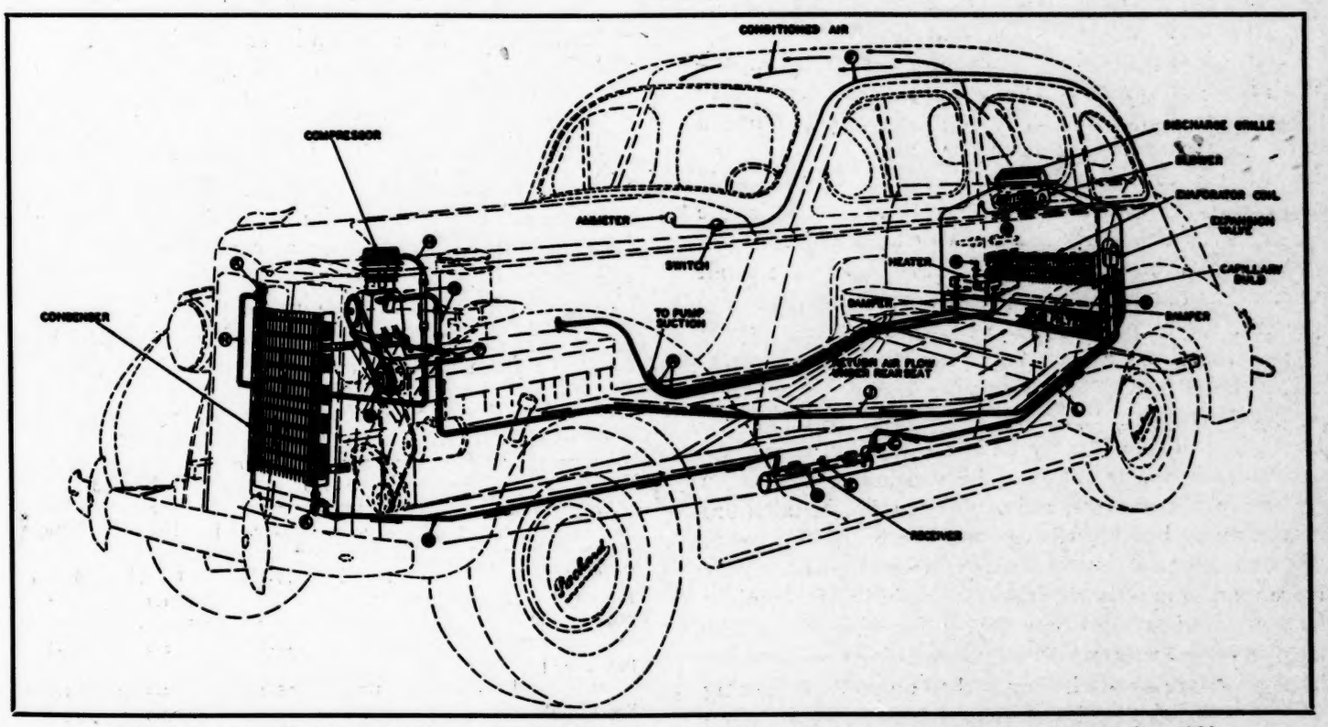


Diagram of cooling and heating equipment for an automobile, offered as a standard accessory for 1940 by an automobile manufacturer.

TABLE I—TOTAL AIR CONDITIONING INSTALLATIONS REPORTED BY 141 ELECTRIC UTILITIES AS SERVED BY THEIR LINES AS OF MARCH 31, 1939

Application	Number	Horsepower
Residential:		
Apartments Private Homes	16,851	17,210.80
Commercial:		
Apartments	60	1,727.25
Banks	373	18,247.91
Barber and Beauty Shops	465	3,408.97
Broadcasting Studios	122	4,404.93
Clubs	207	4,401.29
Funeral Homes	509	5,159.05
Hospitals	314	4,611.34
Hotels	802	40,397.80
Office Buildings	657	86,293.52
Offices, Doctors and Dentists	644	1,690.05
Offices, Miscellaneous	5,462	44,695.67
Public Buildings	308	47,781.33
Recreational	153	2,860.30
Restaurants	3,253	61,879.27
Stores, Department	660	76,405.24
Stores, Drug	621	9,185.19
Stores, Retail Misc.	3,630	64,692.91
Theatres	1,648	151,243.47
Other Commercial	1,246	24,632.74
Industrial:		
Candy Manufacturing	157	9,413.67
Drug and Chemical Mfg.	49	2,329.30
Printing and Lithographing	92	5,846.46
Textile Manufacturing	38	1,839.25
Tobacco Manufacturing	27	1,495.43
Metal Working	3	16.00
Food Processing	78	2,782.35
Fur Storage	86	525.01
Other Industrial	1,232	65,674.88
Total Installations	40,378	770,525.38
Installations included above that use power other than central station electric	21	4,773.00
Self-contained conditioners included above	8,652	18,226.71

dustrial installations as indicated in the table is probably further from representing the true total than is the case in the other groups. This is because industrial plants so frequently operate their own power plants and serve substantial air cooling loads without reporting these loads to the local electric utility.

The report permits statistical analyses and comparisons not possible with any great degree of certainty heretofore. For example, it is possible to arrange a tabulation showing the connected load in the several building types and this has been done in Table II where the ten most important types are listed in the order of the size of the connected load in each.

Table II brings out very well how greatly the profit motive has dominated the use of air cooling up to the present. Or to put the same thought another way, it shows what little acceptance there has been as yet of the idea of providing air cooling solely for comfort without any thought of commercial gain. Of the classifications in Table II only Public Buildings, and Residences and Apartments can be considered as put in without profit motives, although even the installations in apartment buildings have generally been put in with the idea of attracting better tenants or else of getting more rent. Similarly the installations in hospitals might be considered as being only for comfort if we grant that hospitals generally are not operated for profit. Even if all these are allowed, they add to only 8.9%, leaving over 90% of the load as having been put in for commercial purposes.

TABLE II—PERCENTAGE OF THE TOTAL CONNECTED AIR COOLING AND CONDITIONING LOAD FOUND IN VARIOUS TYPES OF BUILDINGS.

	Per Cent
Stores and Store Buildings†	24
Theaters	20
Offices and Office Buildings	17.5
Restaurants, Hotels and Recreational‡	14.5
Factory and Industrial Buildings	12
Public Buildings	6.3
Banks	2.5
Residences and Apartments	2
Hospitals	0.6
Broadcasting Stations	0.6
Total	100

†Includes department stores, drug stores, retail shops, miscellaneous stores and unclassified commercial installations.

‡Includes restaurants, hotels, clubs, and other commercial recreational buildings.

Statistics

Indications are that by next year the statistical picture of summer air conditioning will be much more complete than it is now. The Department of Commerce has been reporting all through 1939 sales figures on a large number of equipments as well as central systems for 267 manufacturers. Since comparable data are not available for 1938 these figures are not of too much value this year. For the present then, it appears that probably the most reliable comparisons of the summer air conditioning business of 1939 as compared with 1938 are those obtained from the electric utilities' reports. The weakness of this method is that it is impossible to get complete returns to questionnaires sent to utilities; in fact it is difficult to obtain more than sketchy returns. Incomplete returns may result in somewhat inaccurate figures, but on the other hand, they should show approximately the trend, providing the utilities are typical ones and cover all parts of the country.

Based on utility reports from all parts of the country, but from relatively few utilities, the year's summer air conditioning business can be summarized as follows: (1) There was approximately a 3% increase in the horsepower of summer air conditioning added to the lines of reporting utilities. But to obtain this slight increase in capacity, (2) the number of installations which were made increased 69%. This large increase of the number of installations was due to (3) a gain in room cooling installations as compared with central systems.

Since, as mentioned, the reporting utilities were relatively few, it is quite possible that if reports had been available from all electric companies the 3% increase

TABLE III—SUMMER AIR CONDITIONING, 1939 AND 1938, BY BUILDING TYPE

Type	1939		1938	
	No.	Hp.	No.	Hp.
Commercial	75.5%	77.5%	67.0%	65.6%
Industrial	2.0	4.9	1.7	7.2
Theater and Recreational	3.5	12.0	5.9	18.4
Public and Institutional	1.2	3.9	2.0	4.5
Residential	17.8	1.7	23.4	4.3
Total	100.0%	100.0%	100.0%	100.0%

SUMMER EQUIPMENT SALES STATISTICS

43 Refrigerating Units† Under 1 hp.; Orders

	1936	1937	1938	1939
Jan				$5,809
Feb				12,610
Mar				26,856
Apr				18,092
May				33,744
Jun	No Data			32,759
Jul				37,196
Aug				19,582
Sep				30,568
Oct				—
Nov				—
Dec				—
YR				—

†For air conditioning uses only

44 Refrigerating Units† 1 to 10 hp.; Orders

	1936	1937	1938	1939
Jan				$34,048
Feb				34,894
Mar				64,894
Apr				94,427
May				132,942
Jun	No Data			118,141
Jul				95,030
Aug				67,300
Sep				49,547
Oct				—
Nov				—
Dec				—
YR				—

†For air conditioning uses only

45 Refrigerating Units† 10 to 25 hp.; Orders

	1936	1937	1938	1939
Jan				$38,772
Feb				46,465
Mar				81,452
Apr				104,400
May				123,988
Jun	No Data			106,436
Jul				44,103
Aug				64,974
Sep				48,183
Oct				—
Nov				—
Dec				—
YR				—

†For air conditioning uses only

46 Refrigerating Units† 25 to 50 hp.; Orders

	1936	1937	1938	1939
Jan				$37,457
Feb				34,140
Mar				80,702
Apr				114,341
May				88,779
Jun	No Data			85,954
Jul				40,764
Aug				48,093
Sep				64,299
Oct				—
Nov				—
Dec				—
YR				—

†For air conditioning uses only

47 Refrigerating Units† Over 50 hp.; Orders

	1936	1937	1938	1939
Jan				$83,765
Feb				63,629
Mar				144,003
Apr				266,230
May				248,996
Jun	No Data			299,354
Jul				287,060
Aug				48,712
Sep				211,882
Oct				—
Nov				—
Dec				—
YR				—

†For air conditioning uses only

48 Refrigerating Units† Total, Tables 43 to 47, Incl.

	1936	1937	1938	1939
Jan				$199,851
Feb				191,738
Mar				397,907
Apr				597,490
May				628,451
Jun	No Data			642,644
Jul				504,153
Aug				248,661
Sep				404,479
Oct				—
Nov				—
Dec				—
YR				—

†Orders, for air conditioning uses only

in horsepower might have been entirely wiped out and a small decrease shown or, on the other hand, the gain might have increased. Consequently, the safer statement may be that, in capacity, the summer air conditioning business in 1939 vs. 1938 was somewhere between a loss of 10% and a gain of 10%.

Of minor importance, but nevertheless significant in a study of trends, may be the following which are noted from electric utility reports. (1) Evaporative cooling seems to be continuing its increase in regions where the climate makes this method possible. (2) The use of the reversed refrigeration cycle continues to be of interest but nevertheless the number of installations continues to be quite small and confined to experimental jobs. (3) In at least one city, gas engine drives for compressors have been removed in favor of electric drives.

TABLE IV—CLASSIFICATION BY SIZE, SUMMER AIR CONDITIONING IN NEW YORK CITY

Size, Hp.	1939		1938	
	No.	Hp.	No.	Hp.
0 to 10	69%	13%	36%	4%
10 to 20	13	10	21	7
Over 20	18	77	43	89
Total	100%	100%	100%	100%

Perhaps the most valuable point which can be gained by comparing utility reports for a given year as compared with the previous year is the distribution of air conditioning in different building types. Table III summarizes this and is based on reports by identical utilities for both years. Decreases in the number of installations were shown in theaters, public buildings and residences, while increases were shown in public buildings and industrial plants. So far as capacity is concerned, decreases (in 1939 compared with 1938) were shown in industrial plants, theaters, public buildings and residences while an increase was reported in commercial buildings.

The major classification continues to be commercial and in fact, during 1939 was even more of an important classification than ever, since it accounts for over three quarters of the number of installations and approximately 78% of the capacity added during the year. Although industrial buildings ranked fourth in number of installations, they ranked third in capacity added during the year.

Since detailed tabulations of each installation are not available for the year's business at this time from all of the utilities, a breakdown by size of only one utility is given here. This is shown in Table IV which is a breakdown for 1939 business added to the lines of

the Consolidated Edison Company of New York, which serves the four largest boroughs in that city. Table IV shows what has already been mentioned, that any increase in capacity was made by adding a large number of small installations, for it indicates that in 1939, 69% of the installations in number in that city were of less than 10 horsepower, whereas in 1938 only 36% of the installations were of less than 10 horsepower. In both of the other classifications, that is from 10 to 20 and over 20 horsepower, the number of installations decreased, particularly in the large hp. classification where the number decreased from 43% to 18% of the total. This decrease in the larger classification caused a decline in the capacity from 89% in 1938 to 77% in 1939.

Following is a summary of 1939 activities in summer air conditioning from reports submitted by electric utility companies:

Omaha—According to the Commercial Department of the Nebraska Power Co., air conditioning installations in that utility's territory were down slightly in 1939 as compared with 1938. A large installation is reported from this territory, a 757 hp. plant in the Ohio National Life Building. There was also a 100-hp. installation in the Paxton Hotel.

Kansas City—Installations during 1939 were up slightly, according to A. D. Marston, industrial engineer, Kansas City Power & Light Co. A 288-hp. installation in a department store was the largest in size. Mr. Marston reports three significant developments in this territory: first, the marked increase in the number of room cooler sales; second, the increased use of evaporative cooling as a producer of low cost comfort; third, the abandonment of three out of four gas-engine drives on compressors. These installations are being changed to electric motor drive. 176 self-contained conditioners of less than 1½ hp. were installed during the year.

Raleigh—In the territory served by the Carolina Power & Light Co. air conditioning installations were up slightly in 1939, with the largest being a 278-hp. job in the Woolworth store in Asheville, according to M. H. Hicks of the Carolina Power & Light Co.

Akron—W. P. Cook of Ohio Edison reports that installations in that company's territory in the Akron district were up slightly as compared with 1938. The largest installation was one of 110 2/3 hp. in an F. W. Woolworth store.

Baltimore—Air conditioning installations in Baltimore were up sharply in number but down in horsepower, according to a tabulation by H. L. Gruehn, secretary of the Consolidated Gas, Electric Light and Power Co. of Baltimore. The number of installations jumped, largely due to sales of 322 room coolers of less than 1½ hp. capacity.

Buffalo—A report by Walter P. Davis of the Buffalo Niagara & Eastern Power Corp. indicates that air conditioning installations in this city were up sharply in tonnage in 1939, with a 240-hp. installation in the new W. T. Grant store, the largest job of the year.

Des Moines—The Des Moines Electric Light Co. through J. M. Dean, Engineering Department, reports air conditioning installations up 50% in number and several hundred per cent in horsepower. 92 installations totaling 2065 hp. were made during the year.

Detroit—According to S. S. Sanford, the Detroit Edison Co., 328 installations totaling 3425½ hp. were added to the lines of that utility during the year. This included 182 room coolers of less than 1½ hp.

El Paso—H. A. Walsh of the El Paso Electric Co. reports a 55-hp. installation in an office building in that city during 1939 with total installations up sharply over the preceding year. The trend toward evaporative cooling, reported from this city last year, continues.

Hagerstown—Reports from this city indicate that air conditioning installations were up slightly in 1939, with the largest installation one of 11¾ hp. One of the installations in Hagerstown during the year was that in a photographic developing room for both comfort cooling and processing. This city reports a strong trend toward self-contained units.

Houston—The Houston Lighting & Power Co., according to D. F. Painter, Jr., added sufficient horsepower in 1939 in the way of air conditioning load to bring the total for the year up sharply over the preceding period. A number of large installations were reported from this city, including one of 2650 hp. in the Gulf Building and Bankers Mortgage Building.

Indianapolis—E. S. Hildreth, Air Conditioning Division, Indianapolis Power & Light Co., reports about the same number of installations in 1939 as in the preceding year but with the capacity off sharply. This city continues to report a number of well water cooling installations and those of this type made during 1939 included two restaurants, five theaters and a general office.

Chicago—Installations of summer air conditioning in Chicago were up slightly in 1939. A good gain was reported, however, in the number of room coolers installed. The largest installation of the year was one of 216 hp. in a Sears Roebuck store. The year's business was largely in the small commercial field, there being only one installation above 200 hp. An interesting point about the installations in this city was the increase in installations in bowling alleys, drug stores, and food stores.

Atlanta—According to Robert Edmond, assistant manager, Georgia Power Co., which serves approximately 80% of the state of Georgia, air conditioning installations in 1939 as compared with 1938 were approximately double in both number and horsepower. The largest single classification was three installations in department stores totaling over 525 hp. There was also a 153-hp. installation in a theater.

Lawrence, Kansas—C. T. Hough of the Kansas Electric Power Co. reports the number of installations in that region running approximately the same as last year but with the capacity off from 1938.

Manchester, N. H.—The tendency in this city is toward room coolers, according to Jack L. Calpin, commercial sales supervisor of the Public Service Co. of New Hampshire. The number of installations in this territory was down in 1939 but the capacity was almost double that of the preceding year.

Newark, N. J.—The Public Service Electric and Gas Co. reports that air conditioning is up slightly in the entire territory served by that utility. The largest installation added to the company's lines was one of 320 hp. in a department store.

New York—According to a report by E. F. Jeffe, vice president of the Consolidated Edison Co. of N. Y., Inc., air conditioning installations in Manhattan and Bronx were up slightly in horsepower and up sharply in number; only about half the capacity was added in Brooklyn during the year as in the preceding year and the same was true of Queens. The drop-off in the latter borough was due to the fact that 1938 was artificially high on account of the World's Fair installations.

Philadelphia—Philadelphia Electric Co., through H. H. Mather, industrial promotion, reports an increase in number but a decline in capacity of air conditioning systems added to the lines during 1939 as compared with 1938. During 1939, 310 installations totaling 6120 hp. were added. For 1938 the number of jobs was 292 with a capacity of 7967¾ hp.

Pittsburgh—One of the utilities operating in this region reports air conditioning up slightly in its territory but down sharply in tonnage.

Portland, Me.—There was an increase in air conditioning in 1939 in this city as compared with 1938, according to a report by L. G. Libbey of the Cumberland County Power and Light Co.

Providence—According to C. R. Broadhead, Narragansett Electric Co. of Providence, air conditioning installations were up sharply in 1939 as compared with the preceding year. The largest installation during the year was one of 180 hp. in a variety store. The trend in this city is toward air conditioning small neighborhood theaters. This company reports five theaters cooled during the year.

Richmond, Va.—The Virginia Electric and Power Co. reports for its territory the addition of 87 installations totaling 1667 hp. as compared with 52 installations totaling 1099 hp. in the preceding year, according to Leon L. Bon, sales engineer with that utility.

San Francisco—One of the largest utilities in this region reports air conditioning down slightly in 1939 as compared with 1938, with the largest installation one of 135 hp. in a State office building. This utility reports the installation of a reverse cycle job in a residence and a notable increase in the volume of evaporative coolers being installed in the interior valleys of California.

Washington—According to J. P. Schaefer, commercial engineer of the Potomac Electric Power Co., 204 installa-

tions totaling 4982 hp. were added to that utility's lines during 1939. This compares with 189 installations totaling 4126 hp. in 1938. It is interesting that during 1939 only seven government building installations are reported totaling 1004 hp.

Boston—The number of jobs was down sharply and the horsepower up slightly in this city during 1939. The largest installation during the year was one of 900 hp. in the new building of the New England Mutual Life Insurance Company. The total number of installations during the year was 59 of which 53 were commercial; the total horsepower was 1763 of which 1639 was commercial.

Air Conditioning with Ice in 1939

By EMERSON BRANDT
Secretary, Technical Department
National Association of Ice Industries

Throughout the past year the public has continued to read much about air conditioning in all the various types of reading matter which engages their attention. Furthermore the public has shown general interest in the subject, but the air conditioning market continues to be a buyer's market. Air conditioning systems and installations must be sold. Very few of them are purchased.

These facts have been quite well demonstrated in the field of ice air conditioning. Where the activity has enjoyed proper promotion and sales effort the results have been very satisfactory from the standpoint of number and tonnage of the systems employed and the sale of ice has also proved gratifying to the ice industry. In territories where the sales effort has been light the results in new installations have been correspondingly less. This is in spite of the fact that ice air conditioning systems ordinarily can be installed at a lower cost than others of similar capacity and ability.

The past year has continued to demonstrate that these lower costs did not attract users automatically. As these facts become recognized more and more widely members of the ice industry and their cooperating air conditioning contractors have been devoting more effort to the sale and promotion of ice air conditioning and the results have proved to be correspondingly better during the past year.

The new installations have been applied principally in commercial establishments of various types such as theaters, restaurants, night clubs and others. A few churches have also installed ice air conditioning systems during the year. There has been very little activity in the field of summer air conditioning for homes. This is also a natural result of the meagre promotional and sales effort directed at that field. Indeed it would not be particularly wise for salesmen to expend much effort in the home field at this time when buyers in the commercial fields can be secured with relatively much less sales effort.

No special new developments have characterized the year's activities from the equipment standpoint. All the different general types of systems employing spray type air washers and fin coil equipment have been utilized in both unit and central installations. A major portion of the installations have been central systems. In systems of this type it is possible to include positive introduction of outside air together with provisions for dust removal. Thus a complete system has been provided. Yet the cost is not great because of the saving which is made in the cooling side by the use of ice.

The field of application of two stage ice and water systems has continued to widen during the year. Where it is possible to secure a well water supply and dispose of the waste much of the total load is carried by a primary coil which does a large part of the sensible cooling through the medium of the well water. Additional sensible cooling when it is needed is done by ice water circulated through a secondary coil and this same coil also accomplishes dehumidification at any time when the well water is above the dew point required by the operation.

Where ground water supplies are not available or usable, installers have made use of cooling towers which accomplish evaporative cooling of the water passing through the primary coil. Supplementary cooling, when required, is accomplished by ice water in the secondary coil. In both types of systems the ice tank is always ready to meet the requirements and carry the full peak load whenever conditions in the space or of the primary water supply make this necessary.

Because of the savings made in the primary use of auxiliary water supplies it has been economically feasible to provide 100% fresh air on most of the two stage systems. This is especially pleasing from a comfort standpoint in theaters, restaurants and taverns. In hospitals and medical clinics it has even greater advantages. A system of this type is also most convenient to install in structures already built because it disposes of the problem of locating and installing return air ducts. Undoubtedly the future will bring about additional installations of this type of system.

Well Water for Air Cooling in 1939

By HERBERT C. ANGSTER
Secretary,
Electric Water Systems Manufacturers

Wherever a sufficient supply of well water is available at sufficiently low temperature there seems to be an increasing tendency to use it as an economical means of air cooling, particularly in the case of theaters, department stores, drug stores, banks, hotels, restaurants, night clubs, and factories.

The wide acceptance of well water cooling is indicated by the fact that one manufacturer of electric water systems submitted a list of 31 installations in Ohio and 21 in Michigan. The list included 17 theaters in Columbus, Ohio.

Well water is cooling main street. Significant is the headway that well water cooling is making in smaller towns and villages. One manufacturer submitted an impressive list of installations in banks, restaurants, clothing stores, drug stores, and hotels in Minnesota, including the towns of Marshall, Pipestone, Fairmont, Mankato, Luverne, and Alexandria.

Numerous department stores are being cooled with well water. The air conditioning system in the David-

son Department Store, Sioux City, Iowa, is designed to use well water for the removal of sensible heat and separate apparatus for the removal of moisture. Of the 800 g.p.m. delivered by the pump at 54 degrees, approximately 68% is used first in the sensible cooling coils, then in the fresh air pre-cooling coils, and finally is sprayed on the roof to decrease the sun heat load. The remaining 32% of well water is used first in a second bank of pre-cooling coils followed by its re-use as cooling medium in the separate dehumidification apparatus.

One of the most modern installations wherein well water is used for air cooling is a large and ultra-modern department store in Cicero, Illinois, suburb of Chicago. This installation, handled by the Thomson Engineering Company, Chicago, has pumping equipment with an average capacity of 650 g.p.m. against a total field head of 350 ft. A vertical hollow shaft ball bearing motor of 75 hp. is used. The pump has a bowl assembly, 10-inch, all bronze. The pump shaft is stainless steel. The pump is set 310 ft. below the floor. The column pipe is 7 inch I.D. genuine wrought iron. The shaft tube is 2½ inch extra heavy genuine wrought iron and the line shaft is 1½ inch stainless steel No. 5.

The pump is controlled through a magnetic starter, manually operated, a feature of which is the time-delay relay mounted on panel which automatically starts the booster pump as water rises in the suction inlet.

In addition to using well water for air conditioning the water also is used for cooling the compressors which are operated in combination. The store uses a total of 330 hp. in motors with well water used in combination with compressors for air cooling while a similar store, another unit in the chain, using nothing but compressors, requires 660 hp. in motors.

Typical of the industrial application of well water cooling is the new plant of the Simonds Saw and Steel Co., Fitchburg, Massachusetts. The plant, which covers five acres, is entirely windowless. The air conditioning system, which is the evaporative type, is comprised of four units housed in brick structures at the corners of the main building. Each unit has a well varying in diameter from 8 to 12 in. and in depth from 25 to 64 ft. Water in these wells, which has a temperature of 52F, is pumped at the rate of 150, 275, 300 and 300 g.p.m. giving a total capacity of 1025 g.p.m.

The water not only is used for cooling sprays but also for other industrial purposes. Particularly hot sections of the plant are provided with air which has been forced through cooling sprays and through underground ducts by two fans of 10,000 c.f.m. capacity each, drawing air from two of the units.

The *man coolers* are supplied with air through overhead ducts, two of the units with 109,500 c.f.m. capacity and two with 90,500 c.f.m. capacity. Either inside or outside air may be supplied to the plant. A temperature of 68F is provided in winter with a relative humidity of 50%. Summer cooling is intended to provide temperatures not more than 16F lower than the outside temperature.

Then there is the windowless building of the National Aluminate Corporation in the Clearing industrial district near Chicago. Here the insulation is so effective that heat from the light alone would be sufficient to maintain comfortable interior temperatures with outside temperatures of —10F were it not for the need for ventilating with outside air. Even so it often is necessary to cool interior rooms in winter due to heat from lights and other sources.

Electrically driven turbine pumps deliver water at 53F from two wells about 300 ft. deep, according to Robert E. Hattis, consulting engineer. The building has 63 individual air conditioned spaces, each having an air supply duct with a cooling coil and a heating coil, the latter providing the necessary warmth when needed.

The Chicago Vitreous Enamel Products Company, Cicero, Illinois, has a 1600 ft. well from which it obtains water for cooling the 10,000 sq. ft. of its laboratory. After serving its purpose as an air cooling agent the water then is used in the company's manufacturing processes. The installation has been found eminently satisfactory, according to a company official.

The Meyercord Company of Chicago conditions the air in its offices with well water from a well about 400 ft. deep and provides an ample supply of 30 to 40 g.p.m. at 56F, according to Roy Moffett of the Moffett Company, Chicago, specialists in air conditioning. The Meyercord job has a 26-ton load. It is a year round system, zone controlled.

The Ideal Roller Manufacturing Company of Chicago also uses well water for cooling its offices, but it had to go 1100 ft. before it got a sufficient supply of water at 54F. For air cooling only this would have been uneconomical had it not been for the fact that the water is also used in processing. This is a 16-ton load job.

One of the distinctive advantages of well water for air cooling is the fact that the water remains fairly constant throughout the year. Last summer the Milwaukee City Water Works received numerous complaints from cooling system owners who claimed the lake water piped to them was so warm as to make it useless for cooling. Since July 29 city water ranged from 63 to 68F. Water over 68F is practically useless for cooling. In contrast, there were no complaints from owners of well water cooling systems who found that their water varied from 53 to 58F. Thus the maximum for well water was a full 10F below the maximum for city water —a fact which accounts for the increasing number of wells drilled for the purpose of tapping a dependable and low cost cooling medium.

Handling Condenser Water

Evaporative condensers have now so well established themselves that during the year several manufacturers of cooling equipment added them while others greatly increased the range of sizes and capacities in which these condensers are available. Single condensers are now available with rated capacities up to 200 tons of refrigeration.

With another year of experience in the use of these condensers, findings of previous years are further confirmed to the effect that the method of handling condenser water has to vary with local conditions and is chiefly affected by the adequacy of the water supply and the delivered cost of water. It is also evident that

as more and more air cooling installations are made, to a less and less extent can condenser water supply be drawn from supply sources, used once and then discharged to waste. Either it has to be completely used over and over again or else it has to find more than one use before being discharged.

Steam Jet Refrigeration

This method of producing refrigeration for air cooling again experienced a decline in sales volume from the previous year. There were no reported activities indicating that developments are at hand to restore it to popular favor except in large sizes and in certain industrial applications. No announcements of new equipment of this type were made during the year and no progress was reported on attempts to develop factory prefabricated units.

Absorption Cycle Refrigeration

Again interest in absorption cycle refrigeration was high during 1939. This cycle permits production of cold directly from the combustion of fuel and hence, does not need a power source like steam or electricity. Most interest has lain in the possibility of improving annual load factors in air conditioning plants by using the absorption cycle for cooling and the same fuel and part of the same equipment for heating. Another source of interest is the situation arising where electric and gas utilities are under the same ownership and management and where an unprofitable electric load could perhaps be changed to gas as a fuel under much more favorable circumstances. Whatever the cause or background of the interest, the possibilities of the absorption cycle for producing cooling effect for air conditioning purposes continued to be studied.

Closely related to the interest in the cycle as a basis for important changes in air conditioning methods is the situation surrounding equipment developments for making use of the cycle.

One manufacturer has equipment actuated by either gas or steam and designed specifically for air conditioning application and which has been installed in a few localities during the past several years. It is reported that commercial production on this equipment was expanded during the year with factory schedules calling for the production of several thousand tons capacity. Published records indicate that during the early part of the year some 400 rated tons were installed in some 20 buildings located throughout the southwest and powered by natural gas. Statistical records are incomplete but it will be seen that the sum of installations made during 1939 and in previous years has resulted in a considerable number of installations of this equipment spread well over the country and served by steam from either coal, oil or gas and by the direct combustion of gas. Operating results indicate a steam requirement of about 20 lb. per ton-hour, equivalent approximately to 0.2 gal. oil, 0.25 therms of gas, or 3 lb. of coal. The standard equipment is rated at from 10 to 30 tons and is available in units intended to reduce field installation to a minimum. It is also reported that this same maker is intending to develop units in smaller ratings and which will be fully self-contained and factory assembled.

Another manufacturer placed in the field a small number of complete air conditioning units, operating on the absorption principle, and gathered data on the operation of these units during the summer and fall. The refrigerant water is sealed in these units and there are no moving parts in the refrigerant system. Atmospheric steam from a boiler is used to operate the cooling unit during the summer time. In the winter, steam from the same boiler passes to a heating coil in the air stream for winter conditioning. Naturally, facilities for filtering, humidification and ventilation are included. One of these units was installed in an exhibition house at the New York World's Fair. It is expected that a few of these units will be sold in the next summer.

A third manufacturer is reported as having in process for development a self-contained unit of small capacity using ammonia as the refrigerant with direct gas-firing.

Adsorptive Dehumidification

The adsorbent materials, of which activated alumina and silica gel are best known, continued to profit by the promotion received from the gas industry and also from the rise in industrial activity during the year. Equipment using these adsorbents can be applied readily to make industrial drying independent of outside humidity variations. As a result of the good year it is felt that the coming year's prospects are especially bright. It is becoming increasingly evident that equipment for these purposes is in a good state of development but that lack of understanding of the equipment performance on the part of installers and sellers is a present handicap to increased use.

Although the adsorbents are especially applicable where the latent loads are heavy, the comfort field has long been considered to be a potential worth going after. It was partly because of this feeling that so much and so long continued effort has been put forth to develop unit type equipment which would lend itself to quantity manufacture. During the year a unit appeared on the market using silica gel as the adsorbent, offering continuous reactivation of the bed and priced substantially lower than older equipment of like capacity.

During the year, too, there appeared a so-called resaturation cooler intended for use with the units just mentioned particularly in residence application. With the device, the method consists of drying a larger quantity of air than that required for the moisture removal desired and then re-evaporating water back into this dried air, thereby lowering the temperature. It is stated that the use of this method permits dispensing with auxiliary refrigeration formerly necessary where available water temperatures are high.

Included among the interesting installations of adsorption equipment during the year were one in a candy plant and others in plants where safety glass is manufactured. Indicative of the equipment available at present and of a recent installation is the article describing how adsorptive dehumidification is used in a large pharmaceutical plant and appearing in HEATING

& VENTILATING, Nov., 1939, on page 35. Pharmaceutical products have proved to be a fertile field for use of adsorbent dehumidification.

Chemical Dehumidification

Regulation of the moisture content of air by means of absorbent chemicals such as lithium chloride or calcium chloride brines has been attracting considerable attention for several years. Installations have been made in a variety of buildings and the one at the cotton testing laboratory in the Department of Agriculture Annex in Washington, described in the June, 1939, issue of HEATING & VENTILATING, represents one of the most recent and one in which the requirements to be met were especially exacting.

A recent development is the application of the *unit* idea to equipment of this character. Units of standard dimensions and fixed capacity are now available on the market. They are factory-assembled and reach the site ready for connection to service lines. The idea of varying capacity by putting any desired number of standard cells of beds of the absorbent materials into a metal casing has also been used.

The absorbents have the definite property of permitting the control of humidity simultaneous with temperature control but independent of it. These facts are becoming better realized with each passing year and consequently they are given consideration where this property indicates that their use is advantageous.

Self-Contained Units and Electrically-Driven Compressors

By W. B. HENDERSON
Executive Vice-President
Air Conditioning Manufacturers' Ass'n

The past year was remarkable to heating and ventilating engineers for significant developments in the design of larger *packaged* air conditioners and in new direct-driven compressor units which are assembled complete at the factory, with motor, compressor, and auxiliaries all built on one base. Heretofore, the general practice has been for the contractor to buy, as individual items, the several pieces of equipment needed for an air conditioning installation, and put them together in the field. So far as possible, the equipment manufacturers are now building complete self-contained units, the elements of which are matched by factory engineers for proper field operation. This is intended to relieve the contractor of much of the engineering involved in the selection of equipment, and has the further advantage of effecting substantial reductions in the costs of labor and materials required for installation. Moreover, the trend towards self-contained equipment leads to decided economies of manufacture, through mass production of standardized units, reflecting a lower ultimate cost to the consumer.

Self-contained air conditioners introduced last year range up to a maximum of 25 tons' capacity. For location outside the conditioned area, this line of equipment runs from 5 to 25 tons, the necessary ductwork being no different from that required for a conventional remote installation.

For location inside the conditioned area, self-contained units are now available from 1/3 horsepower for small single rooms, up to 7 horsepower for commercial installations. These have cabinets attractively finished so they may be installed in the finest homes or in the most elaborate shops or offices, without detracting from the prevailing decorative scheme.

The most radical merchandising venture of the year was the launching of a large-scale promotion of the new 1/3 horsepower window units (at $150 retail) through the dealers of a large radio manufacturer. Preliminary reports on this enterprise show that, not only was a satisfactory volume of sales attained on the midget units, but this small type of equipment was also decidedly helpful in engaging the buying interest of air conditioning prospects for larger units. The fear that specialty salesmen would over-sell the cooling ability of small units—and eventually result in public dissatisfaction—apparently did not materialize to any great degree. And there is good reason to believe that once the public has enjoyed an appetizer (from one of these small units), it will soon be persuaded to order a full meal.

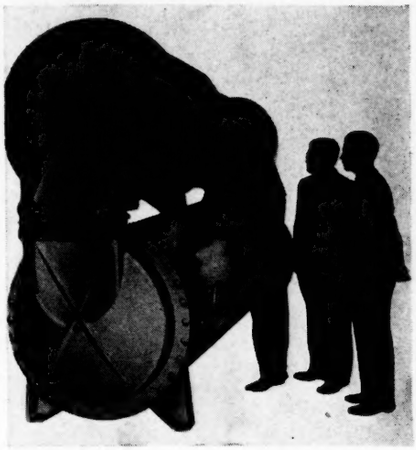
Larger self-contained units came into their own in 1939, especially for medium-sized installations in the commercial field, where they mean substantial savings in first cost to the customer. For the heavy-tonnage installations, of course, the central refrigerating plant is usually preferred because of its flexibility in handling the fluctuating heat load due to solar radiation, varying occupancies of different spaces, etc. But even for large buildings, the self-contained unit is occasionally used because it eliminates so much of the cost of building alterations needed for ductwork from a central plant.

New compressor designs of the past year include at least two lines of direct-driven compressors, which supplement the regular belt-driven machines. The direct-driven machines are now being built in "V," "W," and radial designs, and are claimed to be quite free from vibration. One of them is hermetically sealed, with an arrangement for drawing refrigerant gas through the motor coils in order to keep the motor cool. Built in sizes up to 150 hp., the new direct-driven machines are very compact, and light in weight. Because of their high operating speeds, the machines are statically and dynamically balanced.

The year 1939 also saw new developments in centrifugal compressors for air conditioning, the company which pioneered this type having added some new models, while others introduced centrifugals for the first time.

That the industry is *practicing what it preaches* in the use of air conditioning for precision manufacturing processes, was also brought out during the past year. In checking precision gauges, in the assembly of ground and lapped parts, and in compressor assembly, the industry is now employing complete air conditioning to insure clean air, an even temperature, and a humidity level which will not permit rusting.

PROGRESS IN 1939 SUMMER EQUIPMENT

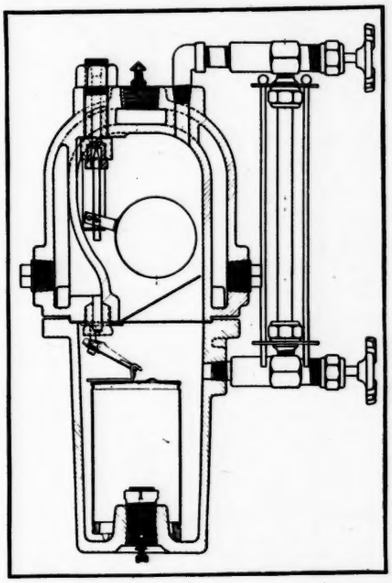


Trane Air Conditioning Water Cooler

NAME—Trane Turbovac.
PURPOSE—A self-contained unit for cooling water for air conditioning purposes.
FEATURES—Turbovac is a hermetically sealed low pressure water chiller. It consists of a compressor of the centrifugal type, a water cooling unit and a condenser all housed within a steel casing in one compact unit. Refrigerant employed is of the Freon family and has a boiling point of 120F at atmospheric pressure. Compressor is powered by two motors which make it possible to cut in one motor at a time, thereby reducing the load on the line and making starting easier. The two motor rotors are the only moving parts. Motors are especially manufactured and are oiled from the outside of the unit when in operation. Impellers are fabricated entirely of nonferrous metal to prevent corrosion and subsequent unbalance. They are given a thorough static and dynamic balance with the motor on which they are mounted. There are two coils of the fin and tube type, one used to chill the water and the other used to condense the refrigerant. Coils are constructed entirely of red brass and are suitable for pressures as high as 250 lbs. per sq. in. Shells are electrically welded of heavy steel plates and all joints are sealed with neoprene gasket material. Turbovac is shipped knocked down in two parts which are said to be easily assembled on the job. Installation requires only water and electrical connections.
SIZES AND CAPACITIES — At present available in one size only, with capacity range from 65 to 80 tons of refrigeration. This unit is approximately 11½ feet long, 8 feet high and 4 feet wide and weighs slightly more than 12,000 lbs. Units of 100, 150 and 200 ton capacity will soon be added.
MADE BY—*Trane Company, La Crosse, Wisc.*

Armstrong Refrigerant Gas Purger

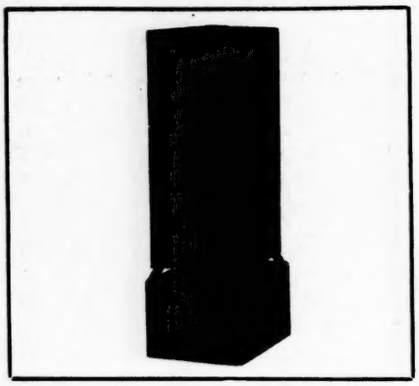
NAME — Armstrong refrigerant gas purger.
PURPOSE—For automatically removing air and incondensable gases from refrigerating systems using any common refrigerant except CO_2.
FEATURES — The lower half of the unit consists of an inverted bucket and valve mechanism, while the upper half contains a ball float and needle valve. The purger is connected to the high side receiver so that it can take gas from the top of the receiver and just enough liquid from the bottom of the receiver to keep the cooling jacket filled.
OPERATION—Refrigerant gas and a small amount of liquid refrigerant enter the purger at the bottom. The inverted bucket mechanism allows the



liquid to enter the purger jacket at suction pressure, which causes the refrigerant to boil and chill the liquid within the purger dome. Gas passes through the vent in the inverted bucket and rises through the chilled liquid. Refrigerant gas will condense while the air present will collect at the top, depressing the liquid level until the ball float sinks and opens the air relief valve. When the air has been purged, all gas passing through the bucket vent will be condensed and the air relief valve will remain closed. When used as a combination expansion valve and purger, the unit is connected directly to the bottom of the condenser. It takes the liquid refrigerant as fast as it forms and discharges it into the low side evaporator. This flow brings any air present into the purger, where it is collected and discharged from the upper chamber.
CAPACITY—Standard No. 243 purger is equipped with a discharge orifice capable of handling any liquid flow up to 30 tons refrigeration per day with ammonia with orifice closed 50% at the time and with pressure differential of 150 lb. This is equivalent to about 8 tons with Freon and 12 tons methyl chloride.
MADE BY — *Armstrong Mch. Works, Three Rivers, Mich.*

Fedders Air Conditioning Coil

NAME—Fedders direct expansion air conditioning coils with inlet header flow control valves.
PURPOSE—For adjusting flow of refrigerant through coils to bring entire surface to maximum efficiency.
FEATURES—Each refrigerant circuit in these direct expansion coils has a flow control valve in the inlet header. This control valve is sealed with a brass cap and gasket which can be removed with an ordinary open-end wrench to expose the adjustable stem of the valve. Coils are shipped with valves in wide-open position. Starting at the bottom of the coil, each circuit can be adjusted to the desired uniform superheat over entire area of the coil. To assist in reading the superheat, clip-on service thermometers are used. The manufacturer states that the use of these valves results in the elimination of dead spots and refrigerant flooding, and makes it possible to adjust each coil to fit the exact operating load and conditions.
MADE BY—*Fedders Manufacturing Company, Buffalo, N. Y.*

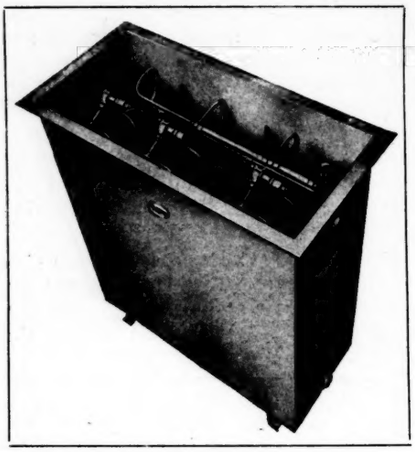


Aqua-Sorb Dehumidifying Unit

NAME—Aqua-Sorber.
PURPOSE — To overcome dampness and high humidity.
FEATURES—Manufacturer offers two models. The first model, BH 100, consists of a metal cabinet 15 in. sq. and 42 in. high. This unit consists of a centrifugal blower, which is controlled by a humidistat mounted on the outside of the cabinet, a filter bed of absorbent material upon which is placed a 100 lb. charge of Aqua-Sorb and a drip-pan. In operation the air is drawn into the unit and passed through the bed of Aqua-Sorb, which extracts moisture from the air. The moisture absorbed forms a brine which flows downward through the filter bed, picking up more moisture and becoming progressively more and more diluted. The Junior model contains 40 lb. of Aqua-Sorb and is ordinarily operated without blower or humidistat, but can be equipped with both or either, as required. This unit is 10 x 10 in. by 18 in. high.
MADE BY—*Aqua-Sorb Company, East Orange, N. J.*

McQuay Cold Accumulator

NAME—McQuay Cold Accumulator.
PURPOSE—Storing cooling effect.
FEATURES — The cold accumulator consists of the specially designed tank containing copper plate coils, upon which a thin coating of ice is formed. The accumulators are designed for either Freon or methyl chloride refrigerants and make possible the use of small condensing units to meet heavy cooling loads of short duration. In operation the condensing unit operates over long periods to build up ice in the accumulator. When there is a demand for refrigeration the refrigerating effect stored in the ice is utilized. The cold accumulator is built of heavy copper plates to which copper tube primary surface is attached and groups of these plates, spaced properly, form a section. One thermal expansion valve is used for each section. The McQuay velocity header is used to furnish the correct amount of refrigerant to each plate. The plates are staggered in each assembly so as to provide alternate dams causing water to flow up and down from 5 to 43 times, depending upon the unit. The control of the thickness of the ice is automatic.
SIZES—Accumulators are built with capacities up to 1,000,000 B t.u.
MADE BY—*McQuay, Inc., Minneapolis, Minn.*



Frick Booster Type Conditioner

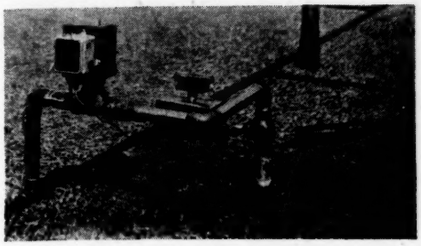
NAME—Booster type air conditioner.
PURPOSE—For installation in ducts which require additional cooling.
FEATURES — Booster consists of finned coils to be inserted in duct and a water cooled condensing unit for supplying refrigerant to the coil which is located outside of duct. The motor in the condensing unit is cooled by a water jacket and the condenser has cooled water on the outside so as to cut down losses from heat that would otherwise collect in the machinery space. In use, the cooling effect is employed entirely for lowering the dry bulb temperature of the air as the air has usually been treated for humidity before reaching the booster.
MADE BY—*Frick Company, Waynesboro, Pa.*

Delco-Frigidaire Air Conditioning Units

NAME AND MODEL NUMBERS — Delco-Frigidaire self-contained air conditioning units, 5 to 10-ton sizes.
PURPOSE—For summer air conditioning.
FEATURES—The 5-ton unit is entirely self-contained, occupies a floor space measuring 44x22 in., and is equipped with a Frigidaire 5-ton two-cylinder compressor and multipath coil. All controls are placed on a concealed but conveniently located panel. The 10-ton unit is also self-contained and is constructed for use with easily installed air return duct connections. This unit is equipped with a 10-ton four-cylinder condensing unit.
SIZES AND CAPACITIES — 5 and 10 ton.
MADE BY—*Delco-Frigidaire Conditioning Div., General Motors Sales Corp., Dayton, Ohio.*

Ilg Attic Fans

NAME—Ilgwind fans.
PURPOSE—For attic cooling and ventilating of residential buildings.
FEATURES — The regular type Ilgwind fan is designed to be mounted on an adjustable pedestal and placed in front of an open attic or hall window. The Southern type Ilgwind consists of a fan mounted on a short stem and housed in a special or locally built suction box for use in attics when the construction is very open and fan must draw directly from the floor below. Box is available complete with grille. An automatic fire switch is available where state or local laws require it.
CAPACITIES — From 3080 to 7600 c.f.m.
LITERATURE AVAILABLE—Bulletin 609.
MADE BY — *Ilg Electric Ventilating Co., Chicago, Ill.*



April Showers Roof Coolers

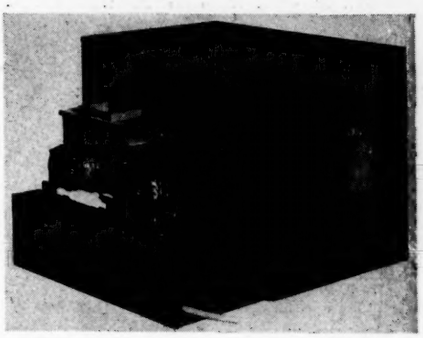
NAME—April Showers roof coolers.
PURPOSE—For reducing sun heat on roofs by the evaporation of water.
FEATURES—Roof cooling system consists of spray nozzles, thermal automatic control, and the necessary pipe and drain connections. The spray heads are made of bronze and are spaced on maximum centers of 16 ft. It is customary to space these heads in equilateral triangular formation to insure even coverage of spray. The thermal automatic control controls the operation of the spray heads. When the roof temperature reaches a predetermined point the automatic control allows water to flow into the spraying system. Water conductors are of type M copper, fitted with sweat-solder fittings. Where spray heads and drain valves are attached standard I.P.S. threaded fittings are used.
MADE BY—*April Showers Co., 4126 Eighth St., N.W., Washington, D. C.*

Reliance Refrigerant Leak Alarm

NAME—Reliance refrigerant leak alarm.
PURPOSE—A signal to warn the operator of an air conditioning or refrigerating plant that the system has become short of refrigerant
FEATURES—Device consists mainly of a small liquid receiver which serves as a float chamber for the internal float. This float chamber is connected to the large liquid receiver and the refrigerant level is registered by the float which operates an external mercury tube switch that will make or break contact as the liquid level rises and falls. When the liquid level falls below the prescribed limit, the mercury tube makes contact and rings the large alarm bell, warning the operator of a shortage of refrigerant. In addition to the bell a red bull's eye provides a visual warning signal. The alarm requires only one connection to be made from the liquid level at the bottom of the refrigerating unit to the float chamber.
SIZES AND CAPACITIES—Model B unit for plants up to 10-ton capacity; model C, 15- to 20-ton capacity.
MADE BY—*Reliance Refrigerating Machine Co., 3401 N. Kedzie, Chicago.*

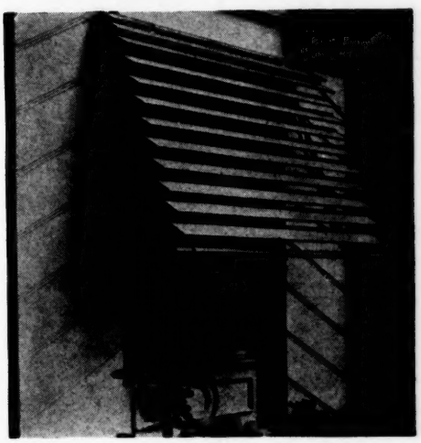
Bryant Silica Gel Dehumidifier

NAME—Bryant silica gel dehumidifier.
PURPOSE—For drying and cooling air.
FEATURES—The construction of these units differs from previous models in that the silica gel adsorbent material is carried in a cylindrical basket that turns continuously. Both the conditioned air and heated air streams are continuous and simultaneous in flow. Dividing seals inside the cylinder separate the two air streams. Cooling is accomplished by the evaporation of water into the dry air produced by the dehumidifier. This partial resaturation is effected in a new resaturating



spray cooler. The resaturation is not sufficient in extent to impair the requisite drying effect. Independent control of humidity and temperature is provided.
SIZES AVAILABLE—600, 1300, and 2700 c.f.m. capacity.
MADE BY—*The Bryant Heater Co., Cleveland, Ohio.*

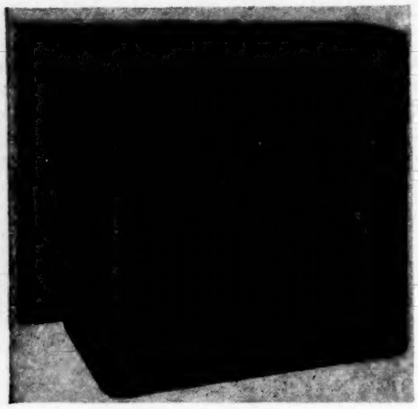
Russell Sheet Metal Awning



NAME—Rusco awning.
PURPOSE—For improving ventilation and reducing sun heat on non-air conditioned buildings and reducing the cooling load on air conditioned buildings.
FEATURES—This is a venetian type awning made entirely of sheet metal. Advantages are said to include year-round sun protection, full visibility, ventilation and light control, as well as the elimination of expense and inconvenience of installing, removing, storing, repairing and recovering. Shutters are made of galvanized Paint-grip sheets which are bonderized at the steel mill to take and hold paint.
MADE BY—*The F. C. Russell Co., Cleveland, Ohio.*

Westinghouse 100-Ton A.C. Compressor

NAME — Westinghouse hermetically sealed 100-ton compressor.
PURPOSE—For air conditioning installations requiring cooling unit of high capacity.
FEATURES — This 90° V-type compressor is stated to require but 1/3 the space and to be 2/3 as heavy as conventional compressors for the same capacity. Compressor has 16 cylinders, is hermetically sealed and is direct driven by a motor with a speed of 1150 r.p.m. Size is reduced by using cold refrigerant gas from the evaporator to cool the driving motor, thus making it possible to install the compressor in a space without regard for ventilation to carry away the heat losses of the motor. Maintenance expense is said to be reduced by the hermetically sealed design as there is no shaft seal. Direct drive motor and compressor are mounted on a common crankshaft and a reversible oil pump provides positive lubrication regardless of direction of rotation. Servicing is stated to be a simple operation since the entire operating mechanism can be exposed by removing the side plates from the crankcase. No pipes need to be disconnected nor is the unit disturbed in any way. Compressor weighs 4200 lb. and is 90 in. long, 32 in. wide and 36 in. high. Compressor is designed to use Freon F12 refrigerant.
CAPACITIES—1,212,000 B.t.u. per hr. based on 37 lb. per sq. in. gage suction pressure, 65F suction gas, 75F water in and 95F water out.
MADE BY—*Westinghouse Electric & Mfg. Co., East Springfield, Mass.*



Wagner Air Cooling Equipment

NAME — Home and apartment cooler.
PURPOSE—For cooling houses and apartments using large quantities of air.
FEATURES—Home cooling unit consists of a fan mounted in a fan cabinet made of heavy gage steel with the walls acoustically treated. Fan and motor are mounted on rubber pads and the design of the steel fan blades is said to result in an extremely quiet operation. The apartment cooler is designed for installation in a window to blow air to the outdoors. Adjustable panels fit the cabinet into any window from 24- to 36-in. wide. Fan is equipped with a Wagner resilient mounted motor. In addition to these two items, the Wagner line includes ring-mounted coolers for installation in the wall and panel-mounted ventilators for windows and transoms.
SIZES AND CAPACITIES—Home cooler is made in four sizes with capacities from 7500 to 20,000 c.f.m. Apartment cooler has a capacity of 3200 c.f.m.
MADE BY—*Wagner Electric Corporation, St. Louis, Mo.*

Nevinger Room Cooler

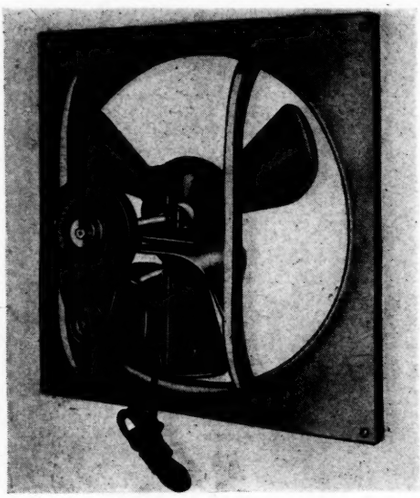
NAME AND MODEL NUMBERS—Nevcoaire room coolers, models W-33 and W-50.
PURPOSE—For air cooling.
FEATURES — Both models are designed to be installed in windows and require only a connection to the nearest light socket. All moving parts are mounted on rubber and the mechanical equipment is isolated from the cooling unit by an insulated panel. Unit is housed in a steel cabinet which is finished with a lacquer and soundproofed and insulated. Model W-33 utilizes methyl chloride while model W-50 uses Freon.
CAPACITIES—Model W-33 has a cooling capacity of 4000 B.t.u. per hr. and will circulate 150 c.f.m.; model W-50 has a cooling capacity of 6000 B.t.u. per hr. and will circulate 250 c.f.m
MADE BY — *Nevinger Mfg. Co., Inc., Greenville, Ill.*

Autovent Attic Fans

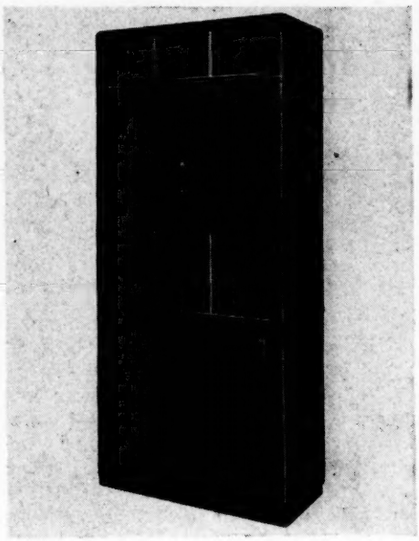
NAME—Coolvent attic fan.
PURPOSE—For supplying outside air to residences.
FEATURES—To a heavy square sheet steel panel is welded steel tubing for fan support arms. The fan shaft is supported by two bearings, mounted in new flange type rubber pillow blocks. A rubber mounted semi-enclosed motor is mounted on a platform securely welded to the steel plate panel. Fans operate at slow speeds from 281 to 577 r.p.m.
SIZES AND CAPACITIES—Six sizes with capacities ranging from 4070 c.f.m. to 21,100 c.f.m.
MADE BY—*The Autovent Fan & Blower Co., 1805 N. Kostner Ave., Chicago.*

Buffalo Forge Attic Fan

NAME—Breez-Air fan.
PURPOSE—For attic cooling of residential and industrial buildings.
FEATURES—All fans of this line have a panel of heavy gage steel with flanged edges which make it easy to install in a penthouse or opening in the wall. The 24-, 30-, and 36-in. sizes are supplied with a newly developed type of motor mounting attached to



the panel. Forty-two and 48-in. fans have a three-point mounting while the 54-in. fan is furnished with a heavy angle iron ring with a three-point tripod mounting. The industrial Breez-Air fans feature increased fan speeds with larger motors and increased capacities. They can be used in any location where a commercial ventilating fan of any type can be used and are much less noisy than a direct connected fan.
SIZES—Residential line, 24 to 54 in.; industrial line, 24 to 48 in.
MADE BY—*Buffalo Forge Co., Buffalo, N. Y.*



GR-Lipman Air Conditioner

NAME—GR-Lipman packaged air conditioning units.
PURPOSE—For summer cooling.
FEATURES — This line of packaged air conditioning units includes five models in two different types—one for home and office use and the other for commercial service. Room cooler model has lift-off type walnut cabinet which may be easily removed for servicing by detaching the two control knobs from the operating panel. An adjustable regulator regulates the length, angle and throw of the air stream. These two room cooler models are equipped with ¾ and 1 hp. compressors. Store conditioner is available in three sizes, 2, 3 and 5 hp. and is so designed that it may be recessed in store shelving, as all servicing may be taken care of from the front of the unit. The top section of these units comprises a combination plenum chamber and silencer and contains the air outlet grille. The lower section houses the condensing unit and controls. Illustration shows store cooler.
SIZES AVAILABLE — Room cooler models ¾ and 1 hp. Store conditioner models, 2, 3 and 5 hp.
MADE BY—*General Refrigeration Corporation, Beloit, Wisc.*

Airtemp Room Coolers

NAME—Cool Breeze.
PURPOSE—A window cooling unit.
FEATURES—Unit requires a window sill mounting and an electrical outlet. Condensing unit has a 1/3-hp. radial compressor which has its working parts finished with the new Superfinish process recently developed by Chrysler. It is said that in operation the room unit is much quieter than the ordinary electric fan.
MADE BY—*Airtemp Div., Chrysler Corp., Dayton, Ohio.*

Ask REMPE

Unit coolers in 336 different sizes and types, for all refrigerants and temperatures. Beautifully streamlined in style. Low operating cost. High efficiency.

Air cooling coils for air conditioning systems headered for gas refrigerants.

Air cooling coils headered for water or brine systems. Similar type coils for steam and hot water heating.

Rempe air conditioning unit for ceiling suspension or use on floor. For heating, cooling, cleaning and circulating air in the store, factory or office all year.

COILS are only one thing we sell. The most important thing we offer is the engineering data, advice and assistance that bring 100% satisfaction with *our* products in *your* installation.

Our 45 years of experience can be mighty valuable to the man who can't afford to gamble on results.

When you want the *right* answer to a tough coil problem —Ask REMPE—REMPE Knows!

REMPE CO., 340 N. Sacramento Blvd., Chicago

THREE BOOKS

FOR ENGINEERS AND CONTRACTORS

DEGREE-DAY HANDBOOK
For checking heating plant operation and predicting fuel consumption. $3.

AIR CONDITIONING IN THE HOME
Fundamental principles of air conditioning, equipment and systems in use. $3.

DESIGN OF INDUSTRIAL EXHAUST SYSTEMS
How to design, build or buy an exhaust system to remove dust, shavings, fumes, etc. $3.

THE INDUSTRIAL PRESS
148 Lafayette St. New York
H&V-1/40

AIR CONDITIONING NOZZLES

Nozzles of unique Yarway Involute Design.

No internal parts or vanes to clog or erode.

Insure trouble-free air washing service.

Sizes and types for all requirements.

Many large users—installations total more than 5 million gallons per minute in water cooling and air conditioning service. Write for Bulletin N-615.

YARNALL-WARING COMPANY
104 MERMAID AVENUE
PHILADELPHIA

YARWAY

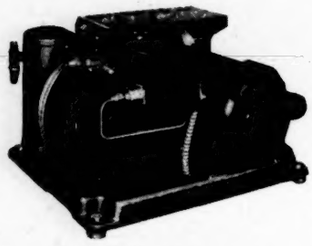
93 Condensing Units from 1/6 to 30 H. P.

CURTIS
REFRIGERATION
AIR CONDITIONING AND COMMERCIAL

Unit Coolers and Evaporator Coils.

For Every Refrigeration and Air Conditioning Requirement

Commercial Refrigeration

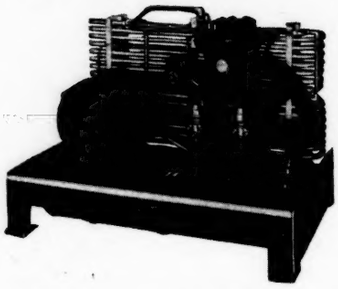


1/6 to 3/4 H.P. Self Contained Condensing Unit.

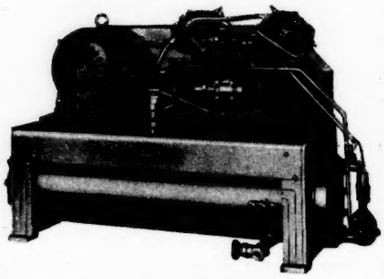
1½ H.P. Air Cooled Condensing Unit. Other sizes from ¼ to 5 H.P.

48 air cooled condensing units from 1/6 to 5 H. P., inclusive, and 45 water cooled units from 1/3 to 30 H. P., inclusive. All models available for either Freon (F 12) or Methyl Chloride. Mechanical advantages include Timken Bearings, Centro-Ring Positive Pressure lubrication.

Special models are available for ice cream, frozen food cabinets and for the dairy industry.

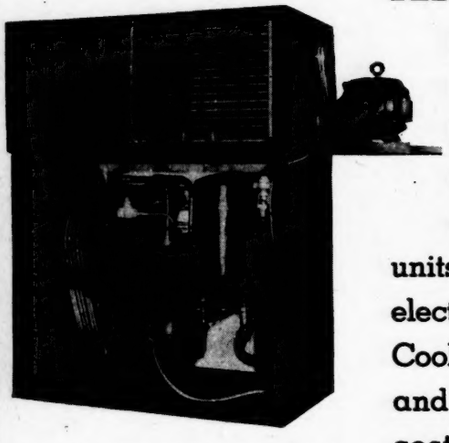


5 H.P. Water Cooled (Counterflow) Condensing Unit. Other sizes from 1/3 to 5 H.P.



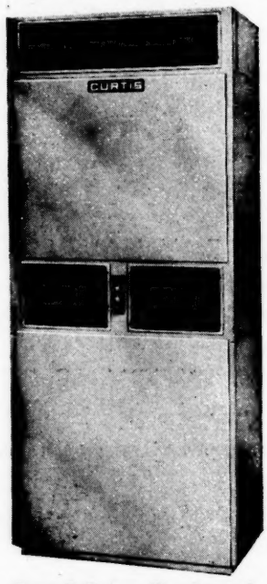
15 H.P. Cleanable Shell and Tube Condensing Unit. Other sizes from 3 to 30 H.P.

Air Conditioning



7½—10—15 ton Complete Remote or Central Type Air Conditioner.

For stores, offices and all types of commercial establishments Curtis offers complete packaged, refrigerated air conditioning units, requiring only water and electrical connections to install. Cools, dehumidifies, circulates and filters the air. Eliminates costly installation expense. Adaptable for heating.



3 and 5 ton Packaged Type Air Conditioner.

Curtis Refrigerating Machine Company

Division of Curtis Manufacturing Company

Established 1854

1999 KIENLEN AVE. ST. LOUIS, MISSOURI

YEAR
'RO

VENTILATING AN

EQUIPMENT . . THAT MAKES A PROFIT FOR THE MAN WHO USES IT

usAIRco
Air Conditioning
EQUIPMENT

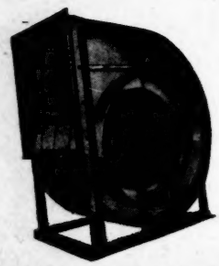
Our conception of our job is to design simply and manufacture soundly—to deliver great equipment value for the money — a value that means reasonable first costs — low maintenance and low operating costs. These broad concepts become specific values in every item of USAIRCO design and manufacture.

Ours is a moderate size, flexible plant. It gives us all the economies of modern production, under close personal supervision, enabling us to give fast service on special items. USAIRCO is the type of plant we feel you'd like to do business with — a flexible, responsive organization.

USAIRCO enters its 17th year of manufacture with a record of thousands of successful installations in post offices, public buildings, auditoriums, theatres, schools, commercial establishments and industrial plants. USAIRCO equipment is proven, guaranteed and value-priced.

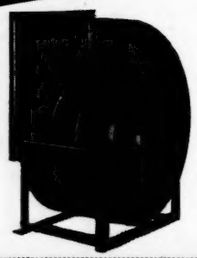
Your inquiries will receive prompt and thorough attention.

PROVEN EQUIPMENT . . . FULL RATINGS GUARANTEED



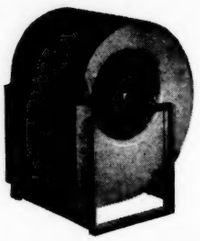
HEAVY DUTY BLOWER

usAIRco Heavy Duty Blowers for Ventilation through any size duct systems. Capacities from 2,000 to 70,000 C. F. M. Available in double and single inlet. Over 5,000 in use in schools, public buildings, theatres.



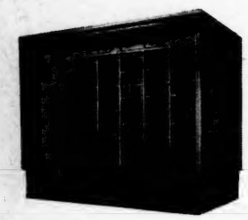
HEAVY DUTY BLOWER TYPE A

usAIRco Type A. Heavy Duty. Backwardly curved blade. Non-overloading power characteristic. Wide range of sizes and capacities.



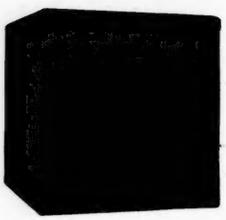
LIGHT DUTY BLOWER ASSEMBLY

usAIRco Light Duty Blower Assembly. Also available in Twin and Triple Assemblies. Capacities 800 C.F.M. to 6,000 C. F. M. Recommended for forced air furnaces and light duty air conditioning applications.



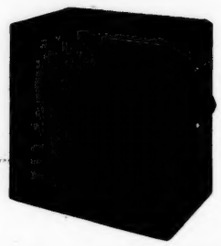
AIR WASHER

usAIRco Air Washers and Dehumidifiers. Capacities 3,500 C.F.M. to 100,000 C.F.M. Built in single, double and triple stages. Special Units can be designed for any application of cleansing, cooling with cold water or refrigeration, or for humidifying or dehumidifying.



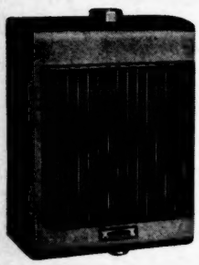
MIDGET KOOLER-AIRE

usAIRco Evaporative Cooling Units. Over 10,000 commercial installations. Capacities 2,500 to 10,000 C.F.M. Low cost cooling with economical operation.



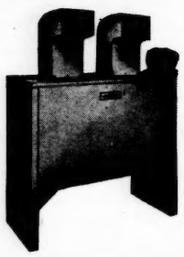
SANIDAIRE

usAIRco Sanidaire Humidifier. Portable unit operating on evaporative principle. Evaporates 5 to 9 gallons of water in 24 hours. Handsome appearance, quiet operation. Guaranteed efficiency.



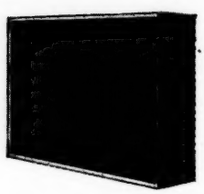
UNIT HEATER SUSPENDED TYPE

usAIRco Unit Heaters. Suspended type equipped with Deflecto Grille. All copper tubes, fins and headers. All Capacities.



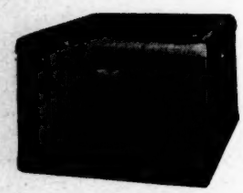
FLOOR MODEL BLOWER TYPE

Blower type unit heaters available in Floor, Wall or Suspension types. Write for special catalog on unit heaters.



HEAT CORES

usAIRco Heat Cores for Central Station Systems. Durable copper finned cores that assure maximum performance. Five Standard Series. All Capacities.



SUSPENDED COOLING UNIT

usAIRco Suspended Cooling Unit. A wide range of sizes for use with cold water or for direct expansion. Also built for combination cooling and heating installations.

A COOPERATING ENGINEERING SERVICE

Available to all factors in the industry are the services of USAIRCO's engineering staff — with a 16 year background in the successful design and application of air conditioning equipment for all types of work — public buildings, theatres, stores and processing plants. USAIRCO engineering service is offered on a cooperative basis.

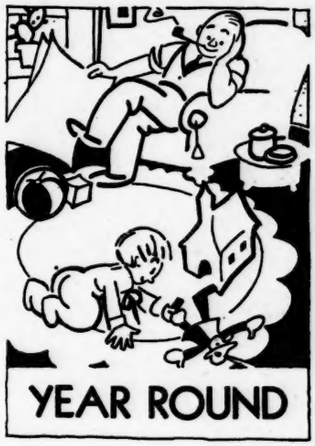
Specific data or complete calalog sent on request.

UNITED STATES AIR CONDITIONING CORPORATION
Northwestern Terminal, Minneapolis, Minn.

usAIRco

usAIRco

Air Hazards in Industry, Bacterial Purification, New Standards and Codes, Highlighted in 1939



THE year-round functions are generally stated to be those involving movement of air and its cleaning and purification. In this section however the intent is to include not only those functions but also those methods, problems and equipment which do not seem to fall logically in either the winter or summer sections of this issue. Because of this, such topics as welding, corrosion, heat transmission, water treatment and preparation of codes and standards are included here as are also the equipment relating to them.

Each year it is necessary to exercise much restraint in preparing this section because of the impossibility of attempting to even mention all of the topics which logically belong here. During the present year there have been such rapid and interesting developments in connection with the general subject of Industrial Ventilation and so many new codes and standards were prepared that they receive attention here even though to do so has meant excluding other topics. So also is the progress so rapid in developing a theory of air-borne infections and in applying light rays to air to render it bacterially suitable that these subjects have been treated more at length than have others.

Air Distribution

During the year the results of a special study on the friction of air in straight ducts appeared. Generally the results indicated that the usual charts used for determining duct friction are correct for most purposes although there was some reason for believing that the friction is somewhat less than indicated by the common formulas. The study confirmed the work of previous investigators in that even small roughnesses and variations in construction detail in ducts were found to affect the friction losses very greatly.

During the year too the United States Department of Agriculture published a booklet describing how mean air velocities in ducts may be determined from Pitot tube readings and how the approximate flow of air may be readily obtained from the mean velocities.

Air distribution within rooms continues to be an interesting problem. More dampers and registers for controlling the flow of air from supply outlets continued to appear. Generally manufacturers of registers and grilles continued to present data on the performance of their products in much more detail than formerly and gave the performance in terms of velocity of air flow and the distance which the air thrown into the room could be expected to travel.

No special changes in general practice regarding the location of either supply or return ducts took place during the year.

Air Hazards in Industry

Industrial air-borne diseases and the provision of factory air which can be depended on not to be held responsible for them are subjects in which there has been a steadily growing interest for several years. The majority of the states now have laws bearing on this and some have set up requirements to be met while others have passed Occupational Disease Laws. The general result has been that not only has interest in the subject grown enormously but active attempts have been made to gather additional information regarding the problem and to systematize that already in existence.

Silicosis is the disease specifically mentioned in some laws and is the one toward which a great deal of attention has been directed. It is known to be closely related to air dust but the mechanism of the disease is still somewhat obscure, so also is there none too much information about dust conditions in factories and in the dusty industries, nor is there satisfactory knowledge of the dust-concentration which must be aimed at. Thus there are numerous phases of the subject and most of these are currently receiving study. It is not possible to devote even passing attention to all of them but a few are mentioned because of their relation to the ventilation problem.

In order to be sure of dust determinations it is necessary to have a reliable method of finding out how much dust there is in a given sample of air. Various methods and instruments have been available for some time and during the year various authors including Anderson, Beadle and DellaValle published data bearing on the subject. Air Hygiene Foundation published a pamphlet outlining methods which may be used in making such determinations and covering not only dust measurements but measurements of concentrations in air of various poisonous gases and vapors as well.

Field studies were made in New York state to gather data showing the dust concentrations actually encountered in foundries and in the various foundry operations. It was indicated that foundry dust concentrations are particularly serious in small foundries employing less than ten men. Also, it was suggested that all foundry dust concentrations should be reduced to 30 million particles per cubic foot of air.

During the year amendments were reported under way whereby the factory code in New York would cover the ceramics industry and bring all the so-called

dusty industries under the rules applying to the silicosis hazard in industry. In Illinois the Industrial Commission published new rules governing the removal of dust and gases from grinding and polishing operations. A Massachusetts publication listed the maximum allowable concentration of dust according to the free silica content as recommended by ten authorities. In Pennsylvania a series of safe practice meetings were held where considerable attention was directed toward safe practices in removing the dust hazard.

Among the methods of combating the silicosis hazard is one which calls for the introduction of fine aluminum dust into the air to offset the effects of quartz dust. Study of this method has been going on for some time and it has been applied experimentally in a Canadian mine in order to determine suitable methods and to observe the effects under working conditions. Denny, Robson and Irwin presented results of their studies in a Canadian medical journal during the year and indicated that the aluminum dust to be effective should be very fine, should be uniformly mixed in the air and should be sufficiently concentrated to provide a minimum concentration in the lung of 1% at all times. The use of aluminum dust for silicosis prevention can be regarded as an interesting and promising method rather than one which is ready for immediate and general use in solving the silicosis problem.

While attention in the past has been especially focussed on the quartz-bearing dusts, it is thought that other dusts are harmful to workers under certain circumstances. During the year some attention was directed toward these and the Division of Industrial Hygiene of the New York State Department of Labor reports that its program includes comprehensive investigation of wood dusts, grain dusts, and others to learn more of their prevalence in industry and of their effects. Work in this same Division also called attention to the fact that certain non-mineral dusts such as those found in tea factories and among grain handlers, tobacco-workers and wig-makers may be regarded as causing industrial occupational diseases. These moves to broaden the field of study of the dust hazard in industry may result in extending the provisions of occupational disease acts to many industries and occupations not now generally covered or recognized.

Attention to the dust hazards in industry did not dominate activities during the year to the exclusion of other hazards found in the air of industrial plants. Fume and vapor concentration in air beyond the tolerable limits also introduce a hazard of considerable importance. These are of such nature that the general methods of attack are similar to those used in attacking dust problems. Information regarding both prevalence of the fumes and vapors and of their allowable concentration in air has been lacking. During the year proposed standards for a few of the common ones appeared and this activity is mentioned elsewhere in this section. Methods of testing air to determine the actual concentrations present were outlined in a set of instructions published by Air Hygiene Foundation while a series of leaflets prepared by a division of the British government also appeared. Limits of flammability of industrial gases and vapor were also studied by the U. S. Bureau of Mines which published results of its work.

Performance of actual devices for securing control of the dust problem by engineering means is important to those who apply those methods. Performance data on air filters of the dry or adhesive impingement types and similar means of removing dust from air have been in existence for some time. So also has there been generally available a certain amount of information regarding the performance of wet filters using water. Little has been available regarding the performance of dust separators of the cyclone type. A study of the performance of a small scale experimental cyclone produced results which were made public during the year.

Recent intense interest in the industrial air hazard situation brought into existence Air Hygiene Foundation which represents the interest of private industry and which has a membership made up of a large number of industrial firms who have a direct concern in the problem of industrial air. It is a non-profit organization and during the year engaged in medical and engineering studies of wide interest.

Under grants from the Foundation, research progressed at the Harvard School of Public Health, The Saranac (N. Y.) Laboratory, University of Pennsylvania and Mellon Institute. Prof. Philip Drinker, Chairman of the Foundation's Preventive Engineering Committee, is in charge of the Foundation's two projects at Harvard. In a paper at the fall meeting, he describes them as follows:

"The design of electroplating tanks, baths, and vats using toxic solvents and liquids has not yet been placed on a rational basis. The purpose of one of the Foundation researches now in progress at Harvard is to investigate the characteristics of these solvent tanks and to provide a rational basis of design by studying their performance under various conditions.

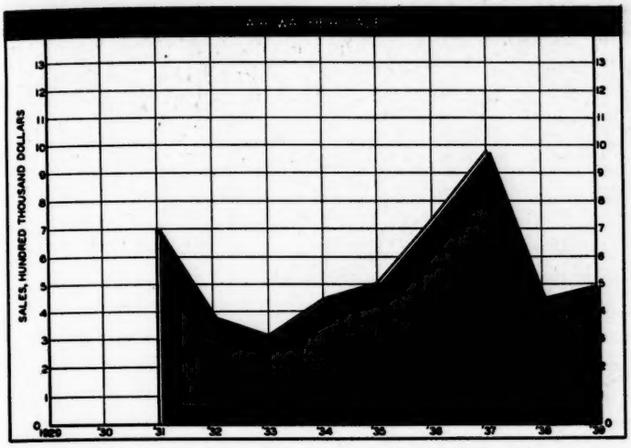
"Small tanks, with lateral exhaust on one or two sides, have been used. Taking several liquids with widely different physical properties, trichlorethylene, water, toluol, triethylene glycol, the minimum ventilation requirements at various temperatures and evaporation rates have been determined. This phase of the work is now nearing completion.

"With reasonable surety it may be stated that the required ventilation in c.f.m. varies as the evaporative rate to an exponent. The use of a minimum quantity, rather than a minimum velocity, has been found necessary in the case of fumes, vapors, and mists, and it is believed that this work gives adequate basis to that fact.

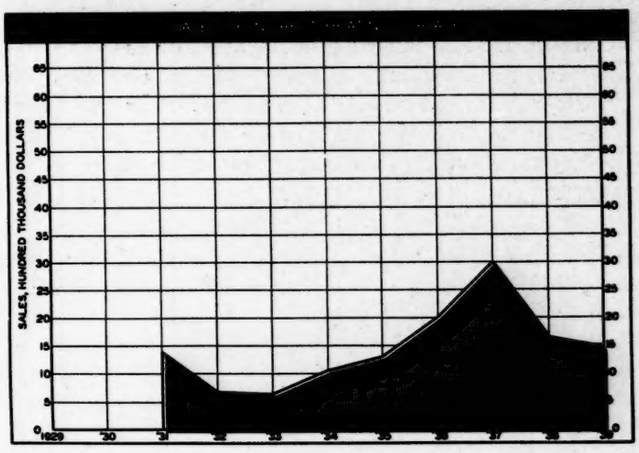
"The second phase of the work has been to ascertain the velocity characteristics of these tanks. The velocities at all four tank corners and at the sampling point are being determined to find which location will give the best and most satisfactory correlation with vapor concentration.

"In addition to the above work, a new vapor-pressure instrument for determining organic solvents in air has been developed. Also, a new dust-counting instrument revision was made.

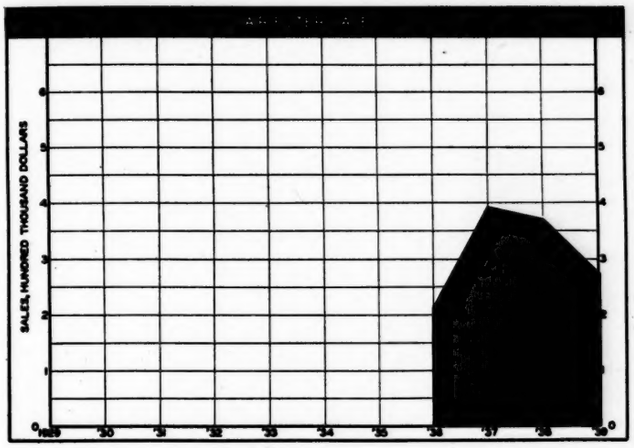
"An important problem in silicosis prevention and in the appraisal of silicosis risks is, 'What is the most potent size of silica particles?' It is recognized that the



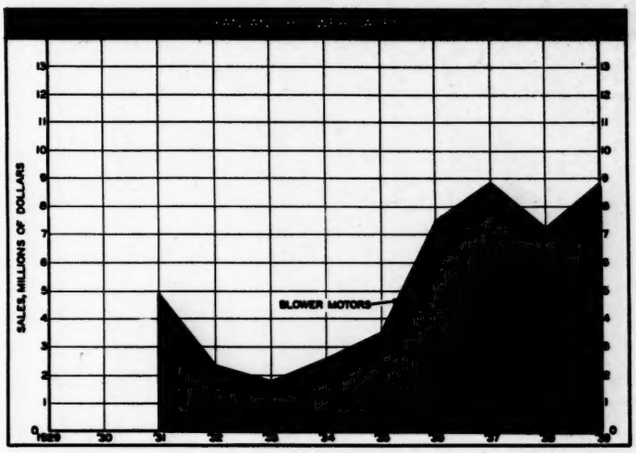
24 The value of sales of air washers as reported by a number of manufacturers. The figures are in terms of orders booked. Data not available prior to 1931.



25 Value of sales of indirect heating (and cooling) surface, including steel, cast iron, and non-ferrous types of surfaces. Figures are in terms of new orders.



26 The value of sales of air filters as reported by a number of manufacturers. Figures are in terms of new orders. Data not available prior to the year 1936.



27 The value of sales of fans and blowers, including fans used for ventilating public buildings, small housed blowers, propeller fans, and motors sold separately.

most dangerous sizes are certainly below 3 microns (a micron is 1/25,000 of an inch) but whether there are critical differences here between particles of 0.5, 1, and 2 microns has not been studied. Accordingly, ground flint (99.7% free silica) was separated into four fractions, 3.30, 1.65, 1.04 and 0.62 microns, and the fractions cleared as far as possible from particles other than the above. Sterile suspensions of these fractions were then injected into the ear veins of rabbits twice at three-month intervals and the animals killed and autopsied periodically.

"Preliminary examination of liver sections indicate that the fine particles are more rapidly taken up by cells than are the larger ones. Later examinations showed no striking effects with the two larger sizes (3.30 and 1.65 microns), while it looks as if the third and fourth (1.04 and 0.62 microns) produced the greatest changes.

"The reason engineers want the information which we hope this study will bring is that we are responsible for measuring degrees of dustiness in workplaces and for controlling conditions. Also, we must design dust respirators. We would like to know what, physiologically, are the most important sized particles and then we can focus our efforts particularly against them.

"An engineering corollary to this problem is 'What is the most difficult size dust particle to wet when floating in air?' and 'What can be done to make the modern air washer into a more efficient dust catcher?' These questions are important to the air-conditioning industry and to all plants where air is cleaned by wet methods. The graduate student who is working on the dust injections is studying commercial air washers with a particular view to the possible application of wetting agents (surface active agents). An incentive to the study of this problem has been the remarkable progress recently in the separation of non-metallic dusts by flotation, a method considered inapplicable to industry only a few years ago.

"As the result of Dr. L. U. Gardner's medical research, backed by many field studies by others, notably the United States Public Health Service, it is now possible to outline and carry out, with reasonable assurance, a reasonable dust-control program. Industry neither demands nor expects from experimental medicine great precision in these matters, such as toxic limits in air. In the field of silicosis they have very nearly got what they need and certainly they now know very clearly how many missing gaps can be filled out."

Meanwhile, medical research progressed on employee health problems.

A department of petrography was established at the

Saranac Laboratory under a grant from Air Hygiene Foundation. This assisted Dr. L. U. Gardner in continuing his studies on the effects of the inhalation of different types of dust. The petrographer classified some 150 samples of rock from 14 different industries, thereby contributing necessary information in the evaluation of dust hazards. Of many minerals investigated, quartz and sericite remain suspended longer than any others. This differential settling emphasizes the importance of taking dust samples in the workman's breathing zone.

At the University of Pennsylvania, Dr. Eliot R. Clark, Professor of Anatomy, aided by Darrow Haagensen, is studying effects of silica in *living* tissue through a *window* affixed to a rabbit's ear.

Statistics

Data on sales of a number of year round equipments, such as year round room units, are available for the first time this year. Since figures are not at hand for 1938 they do not mean much at the present time, but next year additional interesting comparisons will be possible.

For this year, then, comparisons must be confined to filters, washers, fans, and blowers. The total value of all these equipments for 1939 (9 months) as compared with the same period in 1938 shows an increase in dollar value of sales of 12.8%. The following table details this total:

Equipment	Change, 1939 over 1938
Air Filters	— 26.5%
Air Washers	+ 9.0
Indirect Heating Surface	— 10.8
Large Ventilating Blowers	+ 50.7
Small Housed Blowers	+ 2.7
Propeller Fans	+ 12.6
Total	+ 12.8%

Since there are no price indexes or other cost data made public on any of these items it is not possible to determine just how the physical volume of sales for the year compared with 1938.

While information is not at hand to make certain, the drop in sales of air filters may not be true of the total business of all producers as a whole. Reported figures are for filters sold separately only. The volume of business in sale of filters for use as part of complete equipments, and not included in the figures here, apparently increased, at least in physical volume.

Indirect heating surface sales, which also show a drop in the table, are apparently off in dollar volume for the year but not necessarily in physical volume. It is reported that the price received by manufacturers of heat transfer surface has been unsatisfactorily low during the year.

The rather extraordinary increase in sales of large ventilating blowers shown in the table is believed to be partially the result of more complete reported figures. On the other hand, all indications point to the fact that 1939 was a great deal better year for the fan and blower makers than was 1938.

Air-Borne Bacteria

In previous January issues of Heating & Ventilating the work of William F. Wells at the Laboratories for the Study of Air-borne Infection at the University of Pennsylvania Medical School has been summarized. It will be recalled that Wells has demonstrated the possibility of air-borne infection and has developed equipment whereby measurements of bacterial concentration in air can be made. Further, he has made studies of air samples from various occupied spaces to determine bacterial concentrations and worked out a method of determining the amount of ventilation air necessary to obtain desired results.

Wells has now carried his work in connection with air as a vehicle of contagion to a point where he offers a fully integrated theory. The pattern of spread of the contagion has been found to conform to that of contagions such as measles. Similarity of pattern of spread of latent respiratory infection to clinically manifest contagion has been shown by immunity and sensitivity tests, and by epidemiologic studies of age incidence.

Though various factors complicate the clinical pattern of spread of air-borne infection, there is no reason to believe that the epidemic pattern of infection spread differs from the simple basic pattern of spread of clinically manifest contagion.

Aggregation within the same enclosed atmosphere implies that proximity in time and space which dominates the idea of contagion, and is implied by the term *contacts*. Air-borne infections thus become contagious infections. A hypothesis of air-borne infection creates a vehicle adequate to convey infection with the velocity and universality characterizing contagion.

Recognition of vehicles of spread of infection leads to methods of prevention. Studies on prevention of contagion by the bactericidal irradiation of the air we breathe promises conclusive evidence of the importance of air as a vehicle of contagion.

This hypothesis is being carefully subjected to full-scale epidemiologic experiments. Reduction of spread of *contagion,* as defined by the theory, is being tested where the destruction of droplet nuclei infection by bactericidal irradiation of air has been demonstrated.

Favorable results reported by Hart of Duke University, by Overholt of the Deaconess Hospital of Boston, and Meleney of the Presbyterian Hospital of New York, as well as from other installations under observation, have led to the editorial endorsement by the *Journal of the American Medical Association* of the practice of irradiating operating rooms for air purification.

Curtains of ultra-violet light dropped from an ultra-violet light ceiling are used as bacterial barriers to separate new-born babies at the Cradle, Evanston, Illinois, and children in the wards of the Children's Hospital of Philadelphia, the Infants' Hospital of Boston, and the Children's Hospital in Toronto.

Indirect systems of lighting have been installed in a school and in other institutions to prevent the spread of contagion.

The irradiation of recirculated air, first applied to railroad coaches by the Bangor and Aroostook Railroad, has been extended until the principle of irradiating recirculating air is being generally approved.

Irradiation combined with illumination is now offered in attractive fixtures for offices, hotels, stores and other

establishments where artificial light is demanded. Color correction thus becomes an inducement to air disinfection.

Demonstration of health benefits from sanitary ventilation depends upon evidence that more sickness occurs with unsanitary ventilation. Absolute proof requires widespread experience over a long period of time. Evidence that the destruction of droplet nuclei infection by bactericidal irradiation also reduces the spread of contagion through key aggregations is gradually accumulating.

Air Pollution and Cleaning

As a result of a survey in Chicago it was indicated that approximately half the sulphur dioxide pollution in the business district originates in the district itself, while residential districts in the North, Northwest, and South had relatively small concentrations of sulphur dioxide. Low chimneys are found to account for the major portion of this pollution.

The special problem of preparing pollen-free air for hay fever sufferers has become routine in nature and adequate filters for this purpose are at hand. During the year a report by Hodgson gave further conviction to this point.

No strikingly new methods or devices for removing dirt or dust from the air appeared during the year although the principle of electrical precipitation of dust continued to attract much attention. The Fellowship at Mellon Institute on air filters continued active throughout the year. Several new filtering materials for dry or impingement type filters appeared. Generally, filtering for air purification continues to come rapidly to the fore as a full-fledged function of air conditioning.

Codes and Standards

Preparation of standards, codes and similar rules of practice each year becomes more extensive. During 1939 this work went on apace and as a result a number of standards and codes were adopted, published, or importantly amended. Among all those on which there was activity the following are especially noteworthy.

New rules intended to reduce fire hazards in air conditioning systems were added to the existing rules of the National Board of Fire Underwriters. Generally these additions and amendments had to do with provision of cleanout openings in ductwork, exclusive of combustible coverings for ducts, provision of more extensive fire dampers in ducts, automatic extinguishers in ducts preferably arranged to stop operation of system when extinguishers go into action, and regulations covering operations to be undertaken during maintenance and repair of ductwork and air conditioning installations generally. In Detroit a set of rules was drawn up which was even more specific on some points than that of NBFU and which calls for careful location of fire dampers, for smoke detectors in certain types of buildings and for a system of permits and licensing of installers. Generally, one effect of such fire regulations is to increase the cost of air conditioning installations where ducts are used for air distribution. Also to a like extent they tend to make use of self-contained units or of separate conditioning plants on each floor more desirable from a cost standpoint. Tests reported by Underwriters Laboratories during the year indicate that air practically free of solid or liquid particles is not perceptibly electrified as it passes through ordinary blower and duct systems but that if dust or lint is present in appreciable amounts then static charges may be generated of such magnitude that there may be static discharges and a consequent fire hazard.

Included in certain refrigeration equipment standards published by Refrigerating Machinery Association were data of interest where refrigeration is used for air cooling purposes. In addition to data on ammonia compressors, condensers and brine coolers, information was given on F-12 condensers and water coolers, and on F-12 mains and sections and discharge lines.

American Standard Safety Code for Mechanical Refrigeration appeared in revised form during the year. The new set of rules specifies much more closely than did the older one the limitations to be observed in installing systems containing refrigerants in various types and kinds of buildings. As refrigeration for air conditioning purposes is so generally installed in buildings of the types covered by the rules the code directly affects practice in air conditioning. A review of the principal features of this code appeared in HEATING & VENTILATING, Aug., 1939, page 39.

Standards of rating, performance and manufacturing practice on desk, bracket, ceiling, ventilating and air circulator types of fans appeared during the year as Publication 39-56 of National Electrical Manufacturers Association. Another group of fan manufacturers, Propeller Fan Manufacturers Association, was formed during the year and took steps to set up a rating label to be used on propeller type fans tested in accordance with a standard test code.

The reader is referred to pages in the Winter Section where statements will be found regarding the preparation and publication of several sets of standards dealing with heating equipment. These include standards for oil burners, cast iron boilers, and gas-fired equipment. In addition to these it is reported that the manufacturers of cast iron radiators have agreed on standard size schedules for these radiators. It is anticipated that the new schedule will reduce the number of available types by about one-half and will remove from the market most of the odd-sizes and the less popular types.

For some time there has been a committee of American Standards Association at work on a broad program intended to permit the establishment of standards of allowable concentrations of toxic dusts and gases in the air. This is a difficult task since it requires gathering much detailed information part of which has to be established by research. During the year drafts of standards were prepared covering four poisonous gases, viz: carbon monoxide, benzene, hydrogen sulphide, and carbon bisulphide. These drafts are still in a preliminary form but represent what may be expected from time to time as a result of the efforts of this committee. It is anticipated that once standards of allowable concentrations in air are set, these concentrations will form the basis on which workable codes can be drawn up covering the design of suitable systems for preventing the concentration from exceeding the limits set.

YEAR-ROUND EQUIPMENT

49 Air Conditioning Systems†

Orders, Central Systems

	1936	1937	1938	1939
Jan				$125,349
Feb				49,760
Mar				500,727
Apr				212,847
May				349,230
Jun		No Data		93,709
Jul				178,039
Aug				176,261
Sep				185,013
Oct				—
Nov				—
Dec				—
YR				—

†Central year round systems only, incl. labor, for both comfort and industrial applications

50 Air Conditioning Units†

Orders

	1936	1937	1938	1939
Jan				$40,080
Feb				55,064
Mar				129,294
Apr				74,596
May				130,797
Jun		No Data		120,635
Jul				83,008
Aug				172,726
Sep				56,854
Oct				—
Nov				—
Dec				—
YR				—

†Year-round units with coils, filter, and blower, but excl.. of heating and cooling units

51 Air Filters†

Orders, Dollars

	1936	1937	1938	1939
Jan	17,634	17,242	24,878	20,240
Feb	15,213	20,747	19,527	18,538
Mar	43,701	34,542	20,797	26,691
Apr	19,137	53,388	37,340	41,919
May	21,363	38,673	30,391	16,443
Jun	12,430	41,290	34,951	24,957
Jul	11,648	37,185	35,937	27,873
Aug	11,531	32,937	39,855	12,616
Sep	14,952	42,841	39,374	18,889
Oct	23,745	36,815	35,622	—
Nov	9,795	19,084	32,059	—
Dec	9,294	16,464	19,506	—
YR	210,443	391,208	370,237	—

†Includes self-cleaning, medium and low resistance non-automatic, and other types

52 Air Washers

Orders, Dollars

	1936	1937	1938	1939
Jan	39,357	75,350	30,470	42,043
Feb	39,746	37,595	46,855	23,748
Mar	71,673	146,612	42,310	33,189
Apr	79,160	109,642	57,314	35,962
May	84,402	119,987	50,445	54,740
Jun	87,970	115,335	39,566	50,350
Jul	65,738	66,537	37,460	40,293
Aug	51,916	81,460	45,054	62,030
Sep	36,217	80,925	17,088	57,655
Oct	57,247	41,235	26,617	—
Nov	50,292	49,893	36,013	—
Dec	76,633	51,565	22,717	—
YR	740,351	976,136	451,909	—

53 Indirect Heating Surface

Orders, Dollars

	1936	1937	1938	1939
Jan	109,051	257,136	101,319	84,433
Feb	132,484	221,426	106,943	119,409
Mar	168,426	352,549	144,530	123,918
Apr	174,488	395,064	133,072	83,352
May	135,247	247,610	117,256	118,695
Jun	158,860	266,111	161,027	116,217
Jul	158,440	229,144	155,546	114,627
Aug	167,752	274,340	147,294	119,032
Sept	177,748	247,885	104,812	165,194
Oct	170,874	163,432	138,954	—
Nov	229,952	157,509	134,678	—
Dec	234,873	192,560	201,737	—
YR	2,018,195	3,004,766	1,647,168	—

54 Large Ventilating Blowers

Orders, Dollars

	1936	1937	1938	1939
Jan	88,308	130,765	88,209	161,058
Feb	105,753	134,643	245,710	177,283
Mar	178,453	200,310	184,460	238,620
Apr	195,756	287,135	169,769	218,824
May	160,342	212,237	178,963	326,461
Jun	135,831	197,762	171,471	230,922
Jul	139,386	138,423	99,476	224,913
Aug	140,345	168,248	157,591	273,339
Sep	133,362	135,137	86,765	231,738
Oct	147,963	110,867	140,097	—
Nov	128,935	103,082	139,021	—
Dec	103,770	103,975	168,184	—
YR	1,658,204	1,922,584	1,829,716	—

55 Small Housed Blowers (Merchandise Units)

Orders, Dollars

	1936	1937	1938	1939
Jan	104,708	146,223	132,776	104,722
Feb	65,687	135,289	96,840	88,597
Mar	67,638	143,084	88,972	113,218
Apr	99,391	157,835	90,942	99,248
May	120,943	150,592	141,337	123,337
Jun	149,068	162,736	178,931	240,678
Jul	146,627	196,997	145,108	132,376
Aug	162,243	163,555	155,991	138,471
Sept	155,310	219,878	131,479	153,498
Oct	147,051	160,942	125,701	—
Nov	139,297	139,178	101,110	—
Dec	120,451	110,389	119,663	—
YR	1,478,414	1,896,318	1,508,850	—

56 Propeller Fans†

Orders, Dollars

	1936	1937	1938	1939
Jan	77,359	229,443	162,368	177,446
Feb	136,360	201,150	136,418	143,461
Mar	169,410	236,949	225,166	221,051
Apr	225,890	322,442	261,441	235,802
May	366,804	402,332	305,789	338,918
Jun	395,053	645,301	347,108	516,800
Jul	600,534	579,255	343,898	416,656
Aug	332,278	354,013	288,603	292,102
Sep	284,428	338,788	263,807	286,438
Oct	280,346	283,850	220,080	—
Nov	393,234	276,413	246,944	—
Dec	200,712	191,376	170,196	—
YR	3,462,408	4,061,212	2,971,818	—

†Includes attic fans

57 Pedestal-Type Fans

Orders, Dollars

	1936	1937	1938	1939
Jan				12,186
Feb				507
Mar				2,670
Apr				2,915
May				4,872
Jun		No Data		8,109
Jul				11,206
Aug				2,705
Sep				674
Oct				—
Nov				—
Dec				—
YR				—

58 Fans, Jobbers Stocks

Orders, Dollars

	1936	1937	1938	1939
Jan				31,676
Feb				38,203
Mar				34,197
Apr				69,363
May				65,800
Jun		No Data		88,686
Jul				29,047
Aug				61,810
Sep				59,609
Oct				—
Nov				—
Dec				—
YR				—

59 Blowers, Industrial Use

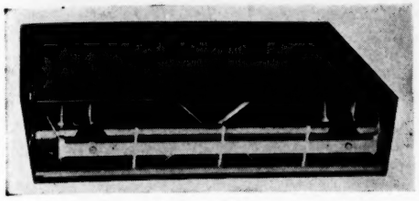
Orders, Dollars

	1936	1937	1938	1939
Jan				220,213
Feb				237,533
Mar				308,926
Apr				291,765
May				356,428
Jun		No Data		425,115
Jul				383,599
Aug				323,004
Sep				415,151
Oct				—
Nov				—
Dec				—
YR				—

60 Domestic Fans

Orders, Dollars

	1936	1937	1938	1939
Jan				27,756
Feb				40,095
Mar				98,914
Apr				30,608
May				26,263
Jun				30,520
Jul		No Data		87,961
Aug				53,282
Sep				73,250
Oct				—
Nov				—
Dec				—
YR				—



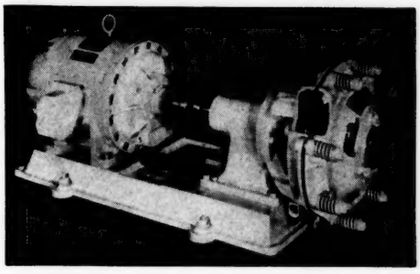
Westinghouse Electrostatic Air Cleaning Equipment

NAME — Precipitron Electrostatic air cleaning equipment.
PURPOSE—For cleaning air.
FEATURES—This is a new line of redesigned and improved electrostatic air cleaning equipment for commercial and industrial uses. Two sizes of cells have been adopted as standard. One, a cell having an effective cross-section 8 in. x 18 in. with a cleaning capacity of 375 c.f.m. and an 8 in. x 36 in. cell with a capacity twice as great. From these two standard units, an air cleaning system for any given physical layout may be constructed. By the "Blackness test" as used by the National Bureau of Standards the larger cell has a guaranteed efficiency of 90% at 600 cu. ft. per min. and 85% at 750 cu. ft. per min.; the smaller cell is 90% efficient at 300 cu. ft. per min. or 85% at 375 cu. ft. per min.

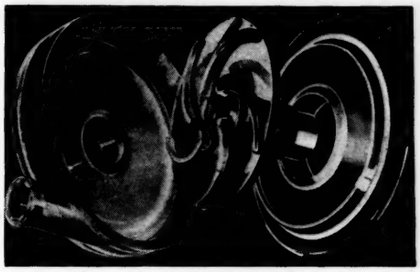
Power packs are also available in two standard sizes: the type S for installations of 1 to 12 large Precipitron cells and the type L for installations from 12 to 50 large cells.
MADE BY—*Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.*

Nash Glass Pump

NAME—Nash glass centrifugal pump.
PURPOSE—For pumping chemical or food products under sanitary conditions or where the products handled must remain chemically unchanged. Also for pumping corrosive materials in commercial quantities.
FEATURES—Pump is made of Pyrex brand heat and shock resisting glass, and impeller and casing are said to be not affected by temperatures up to 150F in standard design, and 200F in special design. Either hot acid or brine cooled liquids may be pumped. The pump is fully transparent and the interior is subject to examination at all times. Cleanliness of the interior and the color and sedimentation of the material passing through may be constantly checked without stopping the pump. It is said the pump may be cleaned in a short time as the whole interior may be laid open in a few minutes. Reassembly is accomplished quickly and the proper adjustment is practically automatic. Glass parts are protected by a cast-iron bracket and cover plate housing. These cast-iron parts are properly plated or coated with a material resistant to the substance being handled. Excessive pressure is relieved automatically if for any reason it should develop in the interior of the pump. Under normal operation the unit can operate with a static pressure on the suction of 20 lb. per sq. in., and discharge pressures up to 50 lb. per sq. in. Pump was conceived by the Corning Glass Works.
CAPACITY—6000 gal. liquid per hr.
MADE BY—*The Nash Engineering Company, South Norwalk, Conn.*



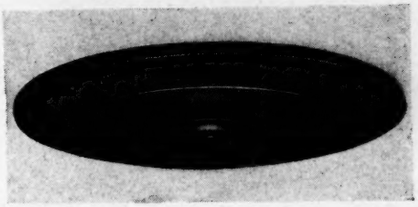
Exterior Nash centrifugal pump.



Pyrex glass casing and impeller.

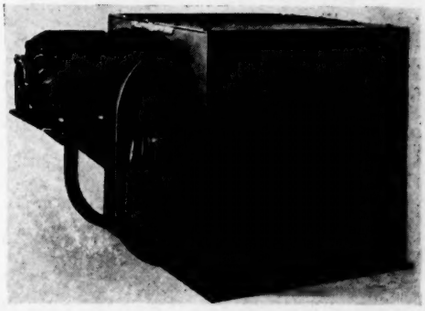
Air Device Ceiling Outlet

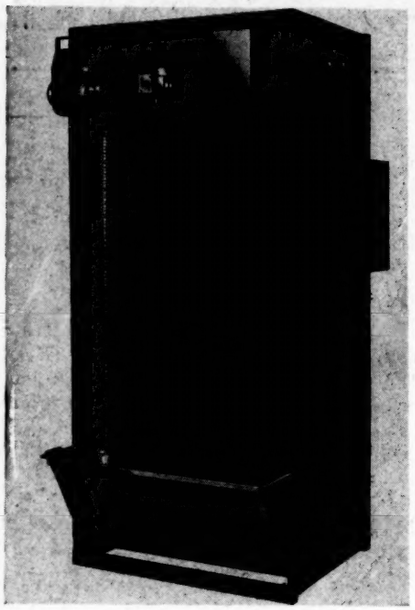
NAME—Agitair Temperature Equalizer.
PURPOSE — For introducing conditioned air into a room or space without draft or stratification.
FEATURES—Device consists of a series of circular spun aluminum members, designed to introduce conditioned air without draft or stratification. Manufacturer states that two shallow air streams are projected at high velocity at diverging angles, one horizontal and the other slightly downward. It is also claimed that the high velocity at the point of discharge supplies the energy necessary to produce a high rate of aspiration which in turn creates secondary air movement within space served to eliminate stratification. The diverging angles at which the air streams are projected are said to create a low pressure area between the two shallow streams that cause turbulence with the primary air blanket at ceiling. This turbulence is said to bring the primary air stream into contact with the room air to act as a brake on velocity and eliminate draft.
SIZES AND CAPACITIES—From 30 to approximately 11,000 c.f.m.
MADE BY — *Air Devices, Inc., 17 E. 42nd St., New York, N. Y.*



Buffalo Forge Fans

NAME—Buffalo "L" Breezo.
PURPOSE—For application where it is desirable to use a propeller type fan but where the motor must be outside the air stream.
FEATURES—Motor, V belt, pulleys and one bearing are entirely outside the path of air being handled. The bearing at the fan end of the shaft which is in the air chamber is regularly of bronze, enclosed and wool packed, requiring oiling about once every 2000 hrs. of use. Where desired, an enclosed ball bearing packed in grease can be furnished and it is said to operate for years without attention or re-oiling. Fans are designed to operate against as high as ¼-in. static pressure. Housings are so designed that the air inlet may be at top, bottom or either side of unit and may be changed from one to another on a job, if necessary. Standard arrangement is bottom inlet.
SIZES AND CAPACITIES—7 sizes ranging from 12 to 36 in. with capacities ranging from 475 c.f.m. at ¼-in. static pressure and 1080 c.f.m. with free delivery for the small unit to 7300 c.f.m. ¼-in. static pressure to 10,800 c.f m. free delivery for the largest.
MADE BY—*Buffalo Forge Company, Buffalo, N. Y.*





American Air Filter

NAME—Electro-Matic air filter.
PURPOSE—For removing dirt particles of practically all sizes from air.
FEATURES—This filter is a combination of an automatic air filter with an electrical precipitator. In operation the front curtain of the Electro-Matic filter acts as a precleaner to remove the heavier dust particles and any bugs, butterflies, or scraps of material that might short circuit the ionizer or the collector plates in the rear curtain. Fine dust and smoke particles which escape the front curtain then pass through the ionizing unit in the center of the filter where they receive a definite electrical charge. Upon entering the electrostatic field of the rear curtain these ionized dust particles are attracted to the charged plates where they are held securely in the oil film on the plates until removed in the oil bath.

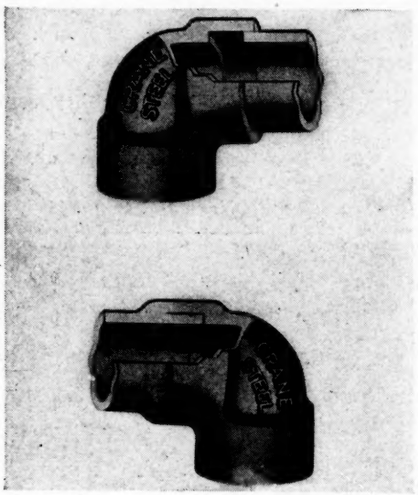
The filter curtain of the Electro-Matic filter is of a new design, which provides the necessary electrical insulation of the plates and a means for charging or grounding alternate plates in certain sections of the curtain. It meets the additional requirement of reverse direction of rotation so that the accumulation of dust and dirt on the front curtain is carried directly down into the reservoir where it is removed by the cleansing action of the oil bath, leaving the rear curtain clean and freshly oiled at all times.

The entire casing of the filter, as well as the front curtain, is grounded. The ionizer is entirely enclosed within the filter and the rear curtain, which is the only exposed part that carries an electrical charge, is protected by a heavy close-mesh grille which prevents accidental or intentional contact.

The Power Pack which furnishes the current for the ionizer and collector plates is mounted directly on the filter casing and all internal electrical connections are made at the factory. Erection is a matter of installing the sections and making the necessary external connections from filter drive and Power Pack to a 110-volt, alternating current lighting circuit.
SIZES—In standard sections of varying heights from 5 to 13 ft.
MADE BY—*American Air Filter Co., Inc., Louisville, Ky.*

Crane Welding Sockets

NAME—Forged steel socket fittings for small welded lines.
PURPOSE—Pipe fittings for use with welded lines.
FEATURES—Fittings have a deep socket which makes possible a considerable amount of leeway in the assembling of pipe. On installations where



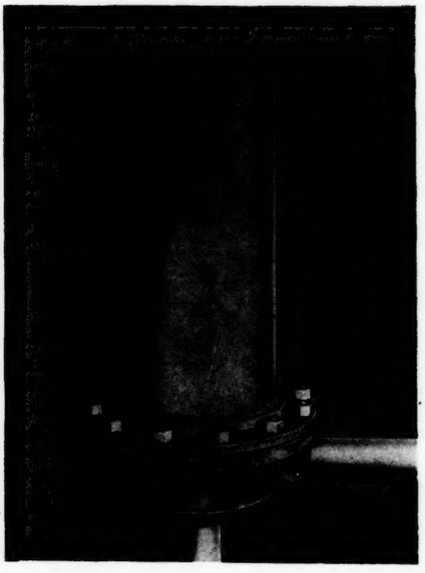
the pipe need not butt against the shoulder at the back of the socket, it is unnecessary for the welder to cut the pipe to accurate length or to cut it off square. On installations where the pipe must butt against the shoulder, free uninterrupted flow can be assured. The manufacturer states that these fittings are especially designed for welding and the socket walls are proportioned to assure a uniform heat distribution and proper heat penetration. It is said that because the weld metal is deposited on the outer surface of the pipe, there is no danger of forming welding icicles which would clog the line and restrict flow. Fittings are made of either carbon steel or carbon-molybdenum and when used with steam, water, oil, or gas, the working pressures at 250F are 1700 lb. per sq. in. for the standard carbon steel fittings and 2550 for the extra strong carbon-molybdenum steel fittings. At a temperature of 1000F working pressures are 380 lb. for standard carbon steel fittings, 570 for extra strong carbon steel fittings, 540 for standard carbon-molybdenum fittings, and 810 for the extra strong carbon-molybdenum fittings.
PIPE SIZES—¼ to 2 in. in the following fittings: 45° and 90° elbow, tee, cap, coupling and reducer.
MADE BY—*Crane Co., Chicago, Ill.*

Torrington Three-Blade Fan

NAME—Airistocrat three-blade fan.
PURPOSE—For moving air with a minimum of noise.
FEATURES—Fan is of one-piece construction, has three blades of patented design, and is offered in 8 and 10-in. sizes. It is said that it is extremely quiet, has an unusually high efficiency and is low in price. Similar one-piece fans with four blades in 10 and 12-in. sizes are also being offered.
LITERATURE AVAILABLE—Bulletin 10339 gives detailed dimensions, prices and performance curves.
MADE BY—*Torrington Mfg. Co., Torrington, Conn.*

Connor Odor Adsorber

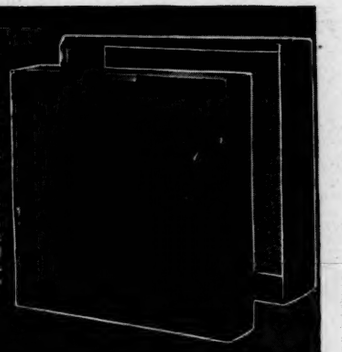
NAME—Dorex pipe line adsorber.
PURPOSE—For removing all types of odors such as oil vapors, fermentation and other objectionable gases from compressed air lines.
FEATURES—Unit is an auxiliary air stream filter of activated coconut shell carbon. It is said that this type of carbon will adsorb odors up to 15 to 20% of its own weight.
MADE BY—*W. B. Connor Engineering Corp., Dorex Air Conditioning Div., 114 E. 23nd St., New York, N. Y.*



AAF COMPLETE *Air Cleaning* SERVICE

MW 4 FILTER

American unit filters—type MW—washable, viscous units are available in either 2" or 4" thicknesses. The 2" filter is for cleaning recirculated air in central systems, unit air conditioners, and domestic systems; the 4" type is for general ventilation and commercial air conditioning. Listed by Underwriters' Laboratory.

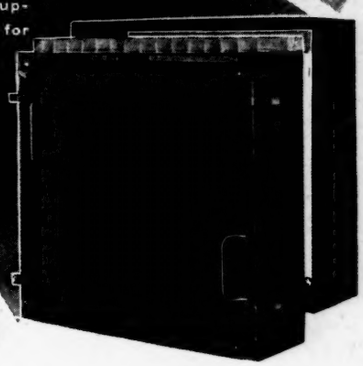


THROWAY

As the name implies, this filter is designed to be discarded after serving its maximum period of usefulness. Its cardboard container encloses filter pad of continuous strands of wire, coated with special fire-resisting adhesive. Particularly applicable to warm air heating and domestic air-conditioning systems.

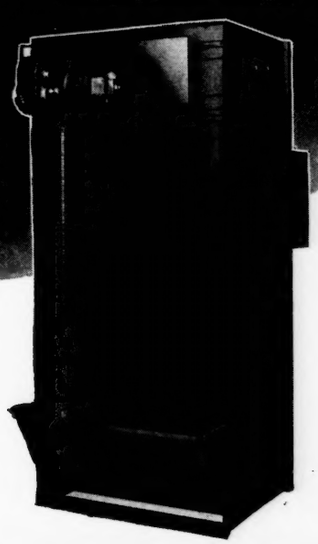
AIRMAT PL FILTER

The most practical and thoroughly satisfactory dry filter ever developed for ventilating and air-conditioning service. Tested and listed by the Underwriters' Laboratory. Uses patented air mat filtering medium, bonded fibre glass, or felt medium supplied in rolls for refills.



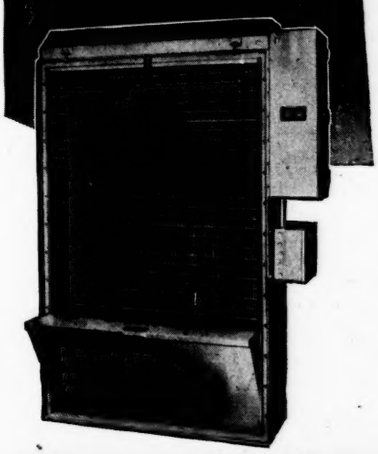
ELECTRO-MATIC

Combines advantages of electrical precipitation and automatic air filtration in single compact unit representing the most advanced and outstanding development in modern air cleaning service. Has established new standards of efficiency in dust removal over the complete range of dust particle sizes.



MULTI-PANEL

A fully automatic filter for either building or industrial ventilation and air-conditioning. Self-cleaning feature places operation on purely mechanical basis, eliminating need of attention and assuring satisfactory performance at all times. Available in any size or capacity.



Bulletins containing complete descriptions and engineering data on each of the above American Air Filters will be supplied without obligation upon request.

AMERICAN AIR FILTER CO., INC.
INCORPORATED
226 Central Ave., LOUISVILLE, KY.
In Canada: Darling Bros., Ltd., Montreal, P. Q.

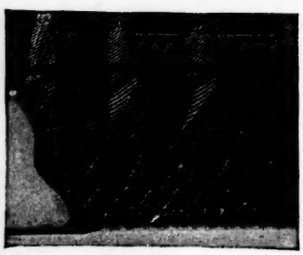
See the AAF Exhibit at the Cleveland A·S·H·V·E· Show *Booths 464-466*

Tilco-Fin Heat Transfer Tubing

NAME AND MODEL NUMBER—Tilco-Fin extended surface tubing No. 581½.
PURPOSE—For providing a high rate of heat transfer between heating or cooling medium and air.
FEATURES—Both the tubing and the fins are of copper. The bond is obtained partially by tension and partially by the sprayed metallic bonding to which all exterior surfaces are subjected. Tube has an inside diameter of 23/40 inch and an over-all diameter of 1½ inches. Manufacturer claims a heat transfer of 22,800 B.t.u. per hr. per sq. ft. with air flow 600 f.p.m., 75° entering air and 5 lb. of steam on two banks of staggered tubes. The resistance to air flow is said to be .045 of an inch of water per sq. ft. face area.
MADE BY—*Tilco-Fin, Inc., 58 Second Ave., Brooklyn, N. Y.*

Air-Maze Filter

NAME—Kleenflo.
PURPOSE—A low-cost cleanable air filter panel for air conditioners, room coolers, furnace blower cabinets and window ventilators.
FEATURES—Fillers are constructed of a maze of alternately placed and exactly spaced crimped galvanized wire screens of a selected mesh. These screens are arranged so as to create graduated and progressive density and to embody the baffle-impingement principle of air filtration. Filters may be cleaned by passing them through a pan of hot water or by placing them under a stream of hot water. After the dirt has been removed an oil of 20 viscosity is sprayed on with an insect spray gun. The manufacturer states that the filters have an air cleaning efficiency from 98 to 99.6%.
SIZES—Four standard sizes 20 x 20 in., 20 x 25 in., 16 x 20 in., and 16 x 25 in. Special sizes up to 500 sq. in. for 1-in. thick panels and 600 sq. in. for 2-in. thick panels.
MADE BY—*Air-Maze Corp., Cleveland, Ohio.*

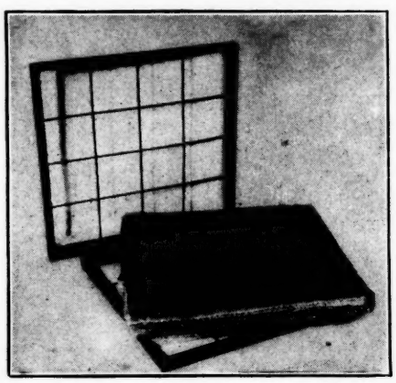


Perham Air Conditioning Unit

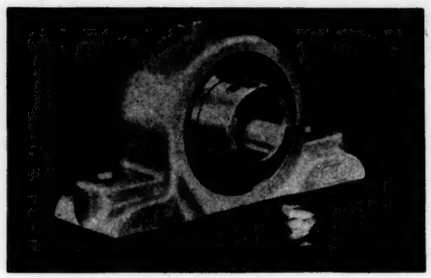
NAME—Perham air conditioning unit.
PURPOSE—For heating, cooling, dehumidifying, filtering, and circulating.
FEATURES—This unit requires the following connections: steam or hot water, electrical and refrigerant or chilled water. A twin fan unit circulates the air after it has been filtered. Fresh air intake permits the introduction of outside air. If desired, the unit may be partially recessed in a wall and all parts are said to be readily accessible. Cabinets can be furnished to suit any decorative scheme.
SIZES AVAILABLE—Seven standard sizes.
MADE BY—*Perham Products, Inc., 133 N. Wacker Drive, Chicago, Ill.*

Research Products Air Filter

NAME—Walton air filter.
PURPOSE—For cleaning air.
FEATURES—Filter consists of a permanent steel frame and grid housing



a replaceable filter element which may be thrown away when dirty. A new filter element may be then snapped into place. The manufacturer states that the dirty element may be easily disposed of since it contains no wires and may be folded for disposal in the firebox or garbage receptacle. It is also stated that since the frame is rigid no angle irons or special supports are needed to hold the filter in place so that production costs may be lowered when this filter is used.
MADE BY—*Research Products Corp., Madison, Wis.*



Ahlberg Ball Bearing Pillow Blocks

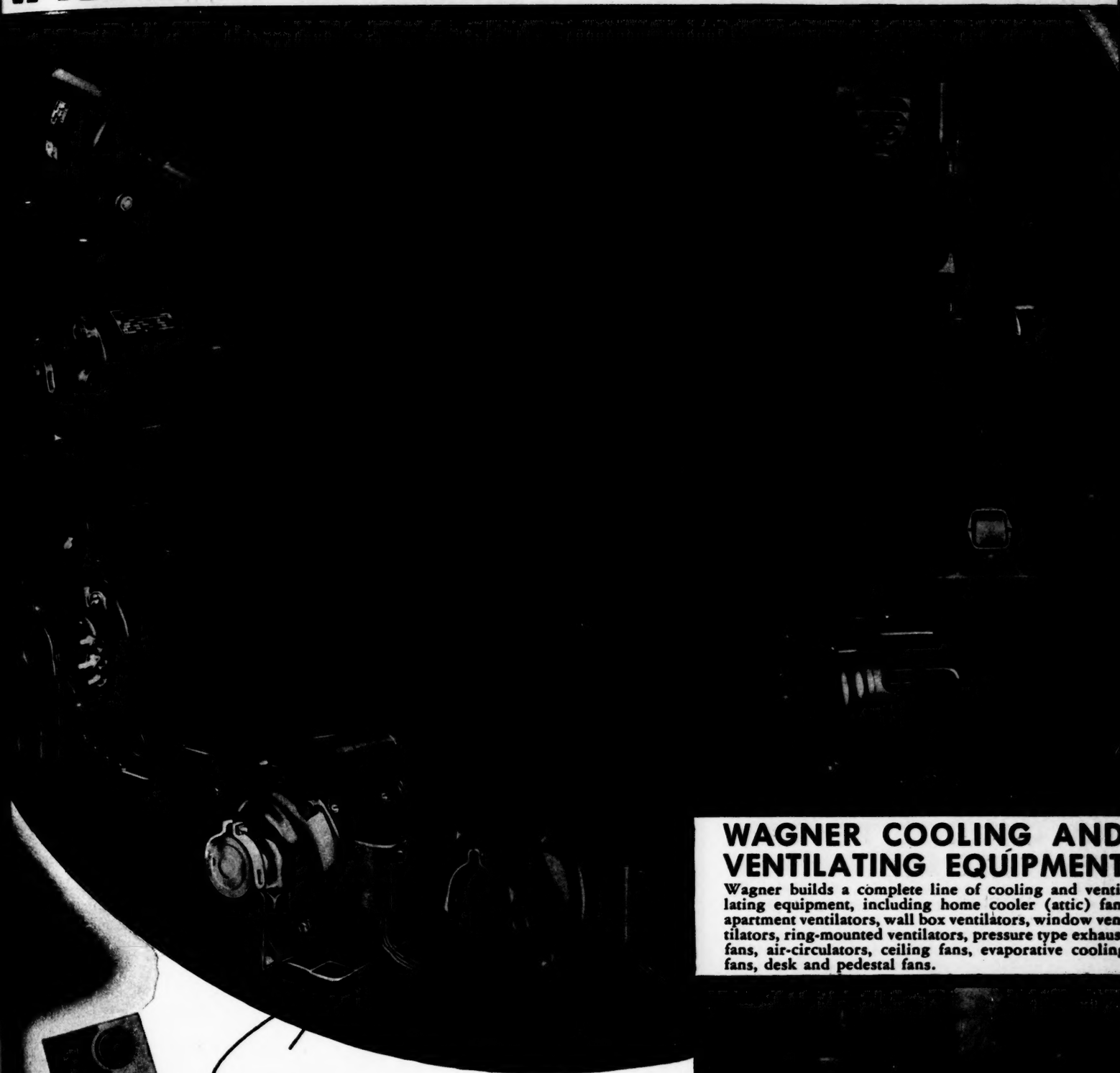
NAME AND MODEL NUMBER—Ball bearing pillow blocks, Series ED.
PURPOSE—To make anti-friction efficiency practical for many light machine applications where the cost of ball bearings has been prohibitive.
FEATURES—Pillow blocks consist of a specally designed Ahlberg single row bearing in a die-cast housing. The ball bearing is assembled to provide for shaft deflection and misalignment up to 1°. Seals are of a floating construction which are said to eliminate friction and increase the life of both seals and bearing. Seals are made of Neoprene, a long-wearing synthetic rubber, which is not affected by oil or grease. The manufacturer states that these low-cost units are especially adapted to air conditioning equipment.
SIZES—Standard shaft sizes are ½. ⅝, ¾, 1 1/16, 1, 1⅛ and 1 3/16 in.
MADE BY—*Ahlberg Bearing Co., 3025 W. 47th St., Chicago, Ill.*

Bell & Gossett Tankless Heater

NAME—Super tankless heater.
PURPOSE — For supplying domestic hot water.
FEATURES — Heater is designed to furnish large volumes of hot water without the use of a storage tank. The heater can be installed below the water line and the boiler water circulated with a pump or installed above the water line and the boiler water circulated by gravity. Removable front plates are provided on the head of each copper coil element so that the coil can be cleaned. The coils are said to be easily removed by simply unscrewing the nuts from the studs which hold the head in the casing. Copper and bronze are used in all parts in contact with surface water.
SIZES AND CAPACITIES — Made in 19 sizes with capacities ranging from 164 to 940 g.p.h., 100F temperature rise using 180F boiler water; with 212F boiler water capacities range from 329 to 1880 g.p.h.
MADE BY — *Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.*

WAGNER MOTORS

for every type of AIR CONDITIONING EQUIPMENT

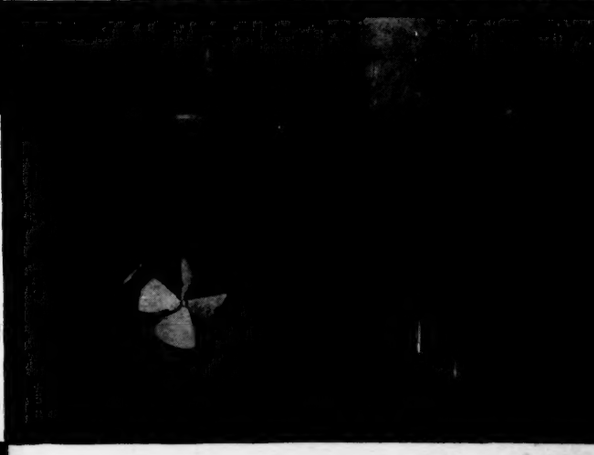


WAGNER COOLING AND VENTILATING EQUIPMENT

Wagner builds a complete line of cooling and ventilating equipment, including home cooler (attic) fan, apartment ventilators, wall box ventilators, window ventilators, ring-mounted ventilators, pressure type exhaust fans, air-circulators, ceiling fans, evaporative cooling fans, desk and pedestal fans.

Send for valuable motor bulletins that tell you how to select the right Wagner motor for every job. These bulletins contain scores of illustrations, cut-away views, cross-section drawings, speed torque curves, etc. Bulletin 177 covers Wagner fractional horsepower motors; Bulletin 182, Wagner integral horsepower motors; Bulletin 179, Wagner single-phase and direct-current motors.

M40-2



Learn how to make extra profit through the sale of fans. Every air conditioning engineer and contractor should have Wagner catalogs that describe the complete fan line.

VibraSeal Pipe and Tube Connections

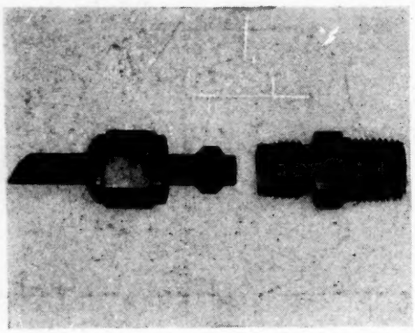
NAME—VibraSeal pipe and tube connections.

PURPOSE—For connecting copper, aluminum or steel tubing to pipe threaded holes and at the same time to protect against tube fatigue, failures, and vibration.

FEATURES—Manufacturer states that this is a new method of connecting tubing to pipe threaded holes and offers the following advantages; protects against tube fatigue, dampens vibration, noise and heat flow and requires no flaring. A threaded nipple is screwed into the threaded or tapped hole, a VibraSeal (rubber-like gasket) is placed on the tubing and a locknut used to compress the VibraSeal to form a flexible seat. The manufacturer states that the connection can be made even if the tubing is not in precise alignment. The gasket is claimed to be impervious to the action of oils, gasoline or gases.

SIZES AVAILABLE—For tube sizes from ⅛ in. to 2 in. outside diameter and in systems designed to hold up to 300 to 400 lb. static pressure.

MADE BY—*VibraSeal Corp., 2832 E. Grand Blvd., Detroit, Mich.*



Brassert Stationary Disintegrator

NAME—Brassert Stationary Disintegrator.

PURPOSE—For removing objectionable fumes from air.

FEATURES—Device is designed to provide an accurately controlled degree of contact between gases and liquids. An application in the air conditioning field is the removal from air of objectionable odors which occur as fumes. Operation is based on the principle of producing a concurrent flow of gas or air and a very finely divided liquid spray at a high velocity through a venturi tube with an impingement on a surface at right angles to the direction of flow. Outstanding features claimed include (1), the degree of cleanness of the gas or air can be accurately varied. (2) The high pressure nozzle for water or other liquids in each unit may be changed or

cleaned without interrupting the main operation. (3) Once adjusted for a given performance, it requires little attention, but can be quickly readjusted when conditions change in the liquids and gases being handled. (4) The contacting ability, when adjusted for specific conditions, is said to be nearly perfect for the exchange of heat between gases, vapors and liquids.

CAPACITY—Standard rating is one disintegrator unit per 1000 c.f.m. of gas or vapor measured at 60F and atmospheric pressure.

MADE BY—*H. A. Brassert Co., 310 S. Michigan, Chicago, Ill.*

Wide Angle Spray Nozzles

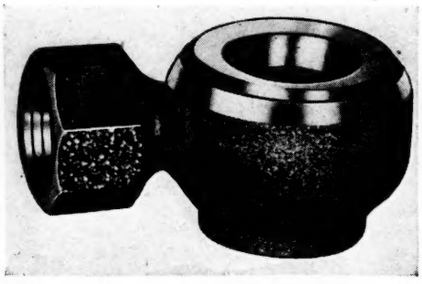
NAME—Parasol non-clogging spray nozzle.

PURPOSE—For use in air conditioning, air washers, air coolers, or wherever a wide spray angle is required.

FEATURES—Spray is of the hollow cone type with a wide spray angle. Nozzles are accurately machined and are available with female pipe connection of ⅛ to ½ in. Standard construction is brass; other materials can be specified.

CAPACITIES—From 0.5 to 4 g.p.m. at 10 lb. pressure.

MADE BY—*Spraying Systems Co., Chicago, Ill.*



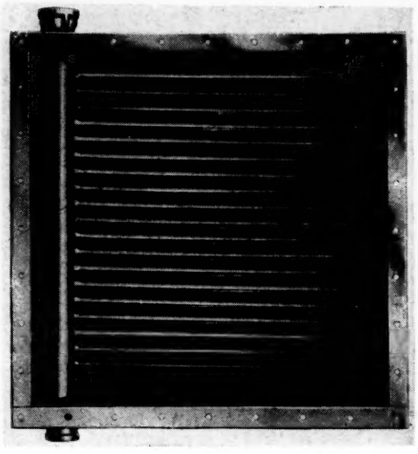
Wing Heating and Cooling Coil

NAME—Wing Featherfin coil.

PURPOSE—For heating or cooling air using steam or hot water for heating, water or refrigerant for cooling.

FEATURES—Coils are made of finned copper tubes bent in hairpin shape to prevent damage from expansion and contraction. Tubes are individually replaceable and are secured to their headers by a mechanical compression joint which, it is claimed, though easily opened, gives permanent tightness. Each section is subjected to a steam test of 150 lb. per sq. in. and a hydrostatic pressure test of 1000 lb. per sq. in. Coils are made in two types, the standard, in which steam is turned on or off or throttled to obtain temperature control and the Safe-Against-Freezing V.T. type. This latter type is said to eliminate the possibility of damage due to freezing which may occur when steam is alternately turned on or off or throttled. This section is designed to permit close control of the temperature of the air discharged and is used for supplying fresh air where inside air is recirculated. A series of built-in air bypasses controlled either manually or automatically controls the temperature of the air stream.

MADE BY—*L. J. Wing Manufacturing Co., 154 W. 14th St., New York, N. Y.*



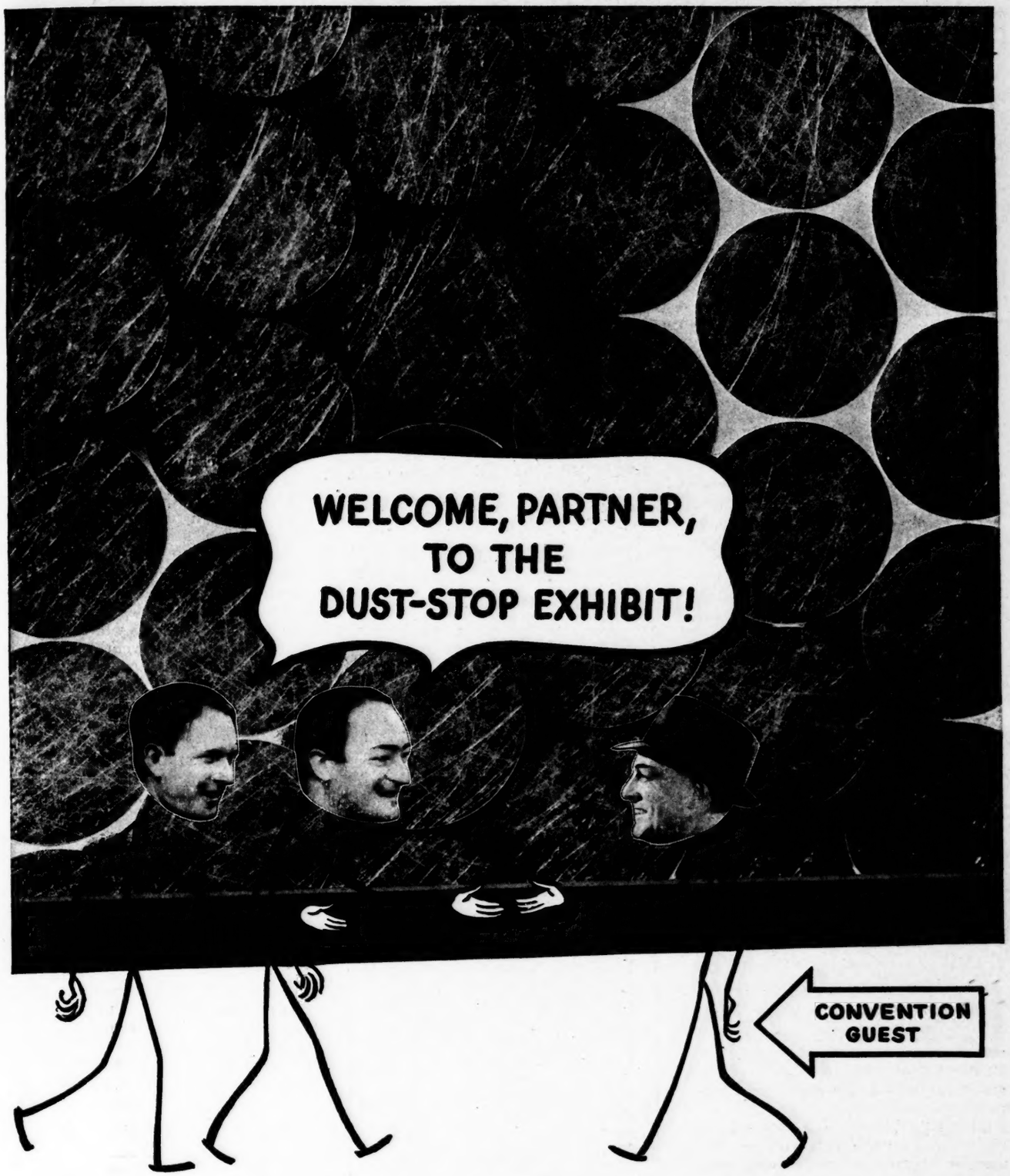
Fairbanks Bronze Gate Valves

NAME—Fairbanks bronze gate valves.

PURPOSE—For controlling fluid flow.

FEATURES—The manufacturer states that these valves have greater strength, longer life and lower maintenance costs. Some of the features incorporated include an extra deep stuffing box packed with special moulded asbestos rings, a large bonnet hex which projects over the bonnet threads, a heavy bronze stem, larger and stronger pipe end hexes, a larger clearance between ends of thread and diaphragm, and reversible type wedges.

MADE BY—*The Fairbanks Co., 393 Lafayette St., New York, N. Y.*



Visit us in Cleveland at the Sixth International Heating and Ventilating Exposition, January 22 to January 26. Booths 846 and 848.

FIBERGLAS* DUSTOP* AIR FILTERS

*T. M. REG. U. S. PAT. OFF.

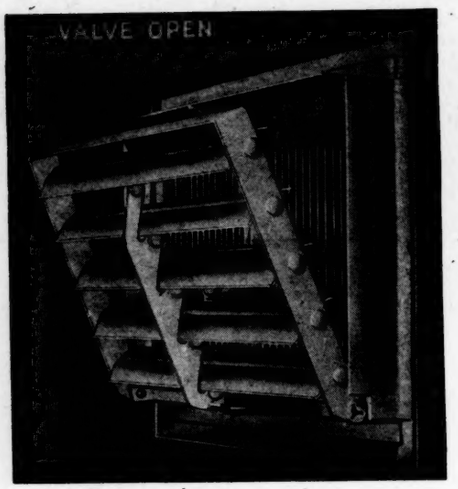
Made by Owens-Corning Fiberglas Corporation, Toledo, Ohio

Hartzell Propeller-Type Blower

NAME—Propeller-type blower.
PURPOSE—For moving high temperature air or air in which the presence of acids or other elements might damage the motor.
FEATURES—Unit consists of a propeller type blower with the motor located on the top of the blower housing. One side of the platform on which it rests is hinged and lock bolts on the opposite side can be adjusted to tighten or loosen the belt or to change it. A V-type belt is used to transmit power from the motor to the fan shaft and this belt can be replaced from outside of the blower. The propeller fan is of a special type and is claimed to give high air deliveries against heavy back pressures.
SIZES—12 standard sizes with propellers from 18 to 48-in.
MADE BY—*Hartzell Propeller Fan Company, Piqua, Ohio.*

Hart & Cooley Register

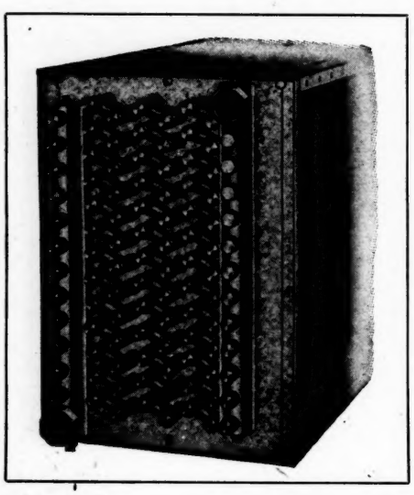
NAME AND MODEL NUMBER—No. 86 design register with turning blade valve.
PURPOSE—A combination register and turning blade for supplying air to rooms.
FEATURES—Register consists of a grille and a set of turning blades. The turning blades are so arranged that they may be closed to shut off the flow of air. The blades can also be adjusted to cause the air to flow up, straight out or down, as required. The regulator on the register face determines the angles of the blades when the valve is open. The air flow can be controlled sideways by adjustable vertical bars which can be turned 45° to either side. Register is interchangeable in the four frames required for various types of installation. The manufacturer states that this one design makes it possible to take care of any job.



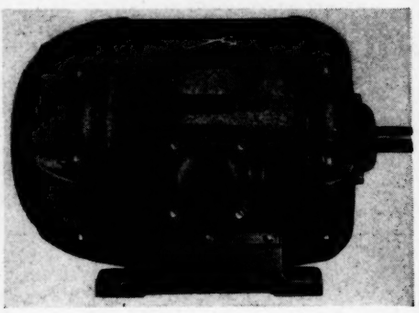
SIZES AVAILABLE—Sixteen sizes from 6 x 4 to 14 x 8 in.
MADE BY—*Hart & Cooley Manufacturing Co., Holland, Mich.*

Mc Quay Water Type Air Conditioning Coils

NAME AND MODEL NUMBER—McQuay type RP water coils.
PURPOSE—For cooling and heating air with water.
FEATURES—The outstanding feature of this coil is that it can be cleaned by removing plugs at each end of the tubes. Non-ferrous plugs screwed into non-ferrous fittings are used to insure easy removal. Coil can be inspected by removing one or two plugs at each end of the tube. Primary surface consists of heavy gage 5/8-in. copper tubing while a secondary surface consists of specially designed flat aluminum fins.



Each fin runs continuously across the full width of the coil and is bonded to the tube by expanding the tube. The housing is made of heavy gage galvanized steel. The coils can be used with steam if desired.
MADE BY—*McQuay, Inc., Minneapolis, Minn.*



Allis Explosion-Proof Motors

NAME—Explosion-proof motor.
PURPOSE—An electrical motor with wide variety of mechanical and electrical characteristics for use in hazardous locations.
FEATURES—It is said that these motors have an unusually strong enclosure with a safety factor of five against any likely internal explosion and have extra wide metal-to-metal fits which prevent the escape of hot flame from any internal explosion. It is also stated that the motors will operate sufficiently cool to prevent the ignition of surrounding atmosphere by the external surfaces. Motors are built to NEMA standards and will operate with equal efficiency either horizontally or vertically. They are available in a large variety of both mechanical and electrical characteristics.
MADE BY—*The Louis Allis Co., Milwaukee, Wis.*

Thrush Water Heaters

NAME—Thrush water heaters.
PURPOSE—For heating domestic hot water using boiler water.
FEATURES—These heaters are constructed of straight copper tubes within a solid cast-iron housing, which provides diagonal boiler water flow. Both ends can be removed for cleaning the heater. Heater may be used with either hot water or steam boilers.
MADE BY—*H. A. Thrush & Co., Peru, Ind.*

Autovent Fan Protective Coating

NAME—Heresite.
PURPOSE—A protective coating for use where fan wheels are exposed to extremely corrosive and highly concentrated acid or gas fumes.
FEATURES—This manufacturer is now offering fans coated with Heresite baked finish, for use in applications where acid proof fans are required.
LITERATURE AVAILABLE—Bulletin No. 201A.
MADE BY—*Autovent Fan & Blower Co., 1805 N. Kostner Ave., Chicago, Ill.*

STAYNEW *automatic* AIR FILTER

Engineered for Greatest Possible Efficiency and Economy . . .

THIS latest model Staynew Automatic Filter operates on the principle of dust impingement. Dust is caught by moving filter panels moistened with oil from a reservoir. The panels are automatically timed to operate at pre-determined intervals, depending on the amount of dust to be removed and the air velocity. The filter possesses a number of unusual features which increase efficiency in dust removal and reduce operating costs. Several of these features are fundamental in design and found in no other filter. The result is a rugged, high-efficiency unit with which extremely large volumes of air can be filtered at low cost.

A. Quickly demountable panel sections. Filter medium is special looped copper mesh on bronze screen. This medium, moistened with oil, presents a maze of small, finely divided, irregular orifices which break up the air stream. Dust particles are impinged on the sides of these orifices.

B. Virtually friction-free construction. Ball bearings throughout. Roller bearing chains carry filter panels. Both panels of a 13 ft. unit may be easily turned with one hand!

C. Absolutely rigid one-piece pressed channel side plates.

★ There are *two* series of endless moving filter panels. Each series provides two stages of filtration—four stages in all. The double series of moving filter panels is exclusive with Staynew. Efficiency is two-fold.

★ The panels travel in a counter-clockwise direction. This is an important, select feature. It means that the outlet side of each series of moving panels is the clean side always.

CONTROL MECHANISM INTEGRAL PART OF FILTER UNIT . . *Just one connection to be made to electric line.*

Telechron motor-driven time switch with *silver contacts*. Time switch is mounted in a glass dust-proof case. Power transmission from sturdy rubber-mounted motor through 400-1 gear box and 3-1 chain and sprocket. Every gear, pinion, bearing, roto timing device, panel section, side-piece—in fact, every major and minor detail of this filter is of the highest possible quality—designed for efficiency, long wear and complete satisfaction.

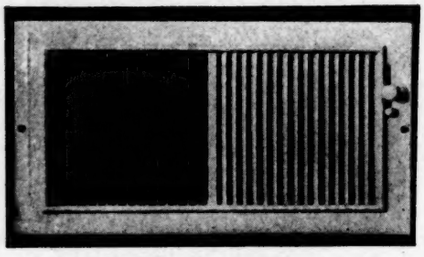
Write for Bulletin 120 for Complete Data. Also Catalog Describing Filters for Engine, Pipe Line and Other Service.

PROTECTOMOTOR AIR FILTERS — 99 and 10 Per Cent Efficient

STAYNEW FILTER CORP.

15 LEIGHTON AVE., ROCHESTER, N. Y.

"AIR FILTER HEADQUARTERS"

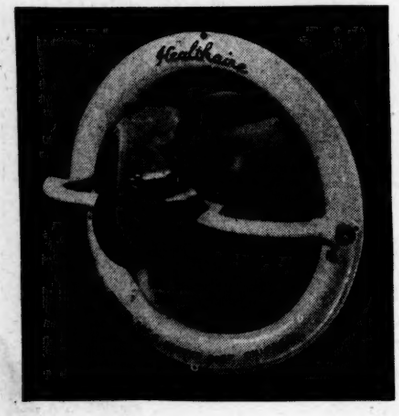


Air Control Register

NAME—Air Control.
PURPOSE—A register for controlling the direction of air flow both vertically and horizontally.
FEATURES—It is said that since the air flow can be controlled either vertically or horizontally only one type register may be used throughout an entire installation regardless of whether duct openings are at the baseboard or high on the wall or in a corner. Vertical control of air flow is secured through a series of movable shutters which are connected to a knob on the upper right hand corner of the register face. This knob also opens or closes the shutters. A small button below the knob is a stop which controls the position of the shutters when open. Any desired angle of deflection may be secured from 15 deg. upward to 30 deg. downward. Horizontal control of the air flow is obtained by adjusting the vertical fins. A special tool is provided for this.
MADE BY—*Air Control Products, Inc., Muskegon, Mich.*

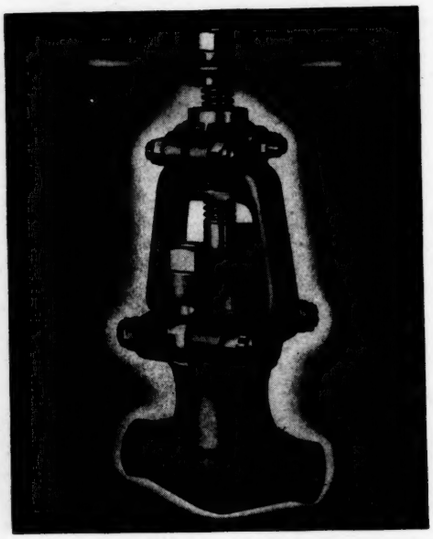
Johnson Propeller Fan

NAME—Special 12-in. propeller fan.
PURPOSE—For general ventilating applications.
FEATURES—Unit is said to deliver a high volume of air for its size and is quiet operating. It can be furnished with or without a 3 speed switch and is made for 110 volt alternating current only. Motor is totally enclosed and is of the non-radio interfering type. Blades are of aluminum.
MADE BY—*Johnson Fan & Blower Corp., 1319 W. Lake St., Chicago, Ill.*



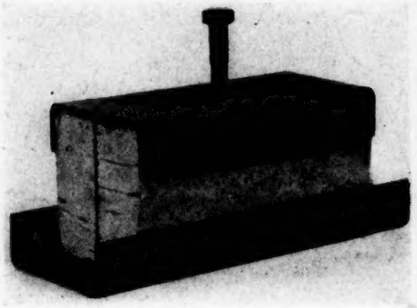
Western Silicair Duct Lining Sheets

NAME—Silicair duct lining sheets.
PURPOSE—For lining ducts to absorb sound and to reduce heat transmission.
FEATURES—These air duct lining sheets are said to have a high sound absorption rating at all frequencies, to be completely fire resistant, to be a good insulator, as well as dustless, smooth, light, strong and easily worked. The manufacturer states that they can be handled without gloves because they are absolutely free from slivers. The sheets are manufactured from a diatomaceous earth which is formed by a precipitation of almost pure silica from the porous shells of skeleton remains of diatoms. This earth is an off-white or pale grey substance resembling chalk and it weighs less and is said to be more porous than chalk. One cubic inch contains millions of diatoms, making a vast intricate cellular pattern which is stated makes it ideal for sound absorption purposes.
MADE BY—*Western Silicair Products, Inc., Burbank, Cal.*



Hancock Valve

NAME—Hancock "No-Bonnet-Joint" valve.
PURPOSE—For handling fluids which may prove dangerous if leakage occurs.
FEATURES—Valve has been developed to end leakage through the gasket joint between the valve body and bonnet at elevated pressures and temperatures. It does this because there is no joint. Valve has no threads, has Stellite seat and Stellite valve disc. Designed for pressure up to 2500 lb. at 1000F.
SIZES—Made in one basic size and then tapped or bored for welding for ½ in., ¾ in., and 1 in. pipe.
MADE BY—*Hancock Valve Division of Manning, Maxwell & Moore, Inc., Bridgeport, Conn.*



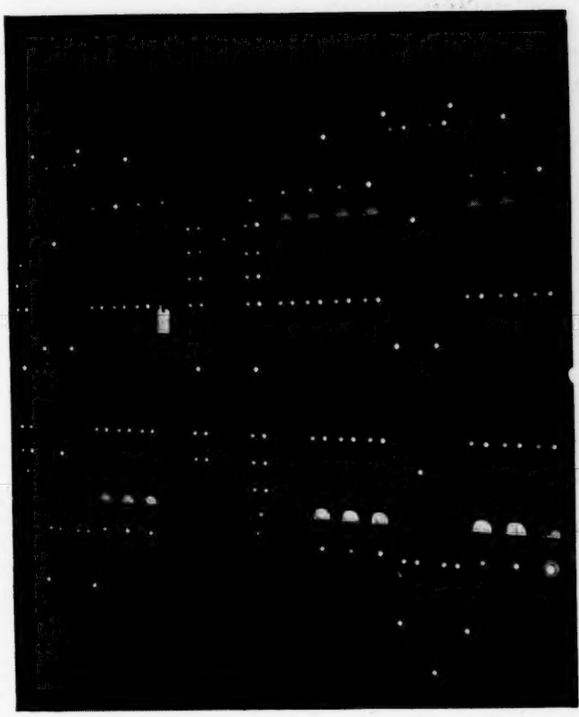
Korfund Anti-Vibration Bar

NAME—Korfund Vibro-Bar.
PURPOSE—For preventing the transmission of vibrations from light motors, fans, power tools, and other light machinery.
FEATURES—Device is made of close-grained cork, encased by pressed steel channels and bonded in place with a special mastic. The top bolt fastens to the machine leg or base and the lower channel is drilled at both ends to receive the floor bolts. The manufacturer states that the cork is both oil and water resistant and that it will retain its elastic properties indefinitely. It is said that the cross-section modulus is ample to prevent bending and twisting in service. The loading range of this damper is 360 lb. per damper.
MADE BY—*The Korfund Co., Inc., Long Island City, N. Y.*

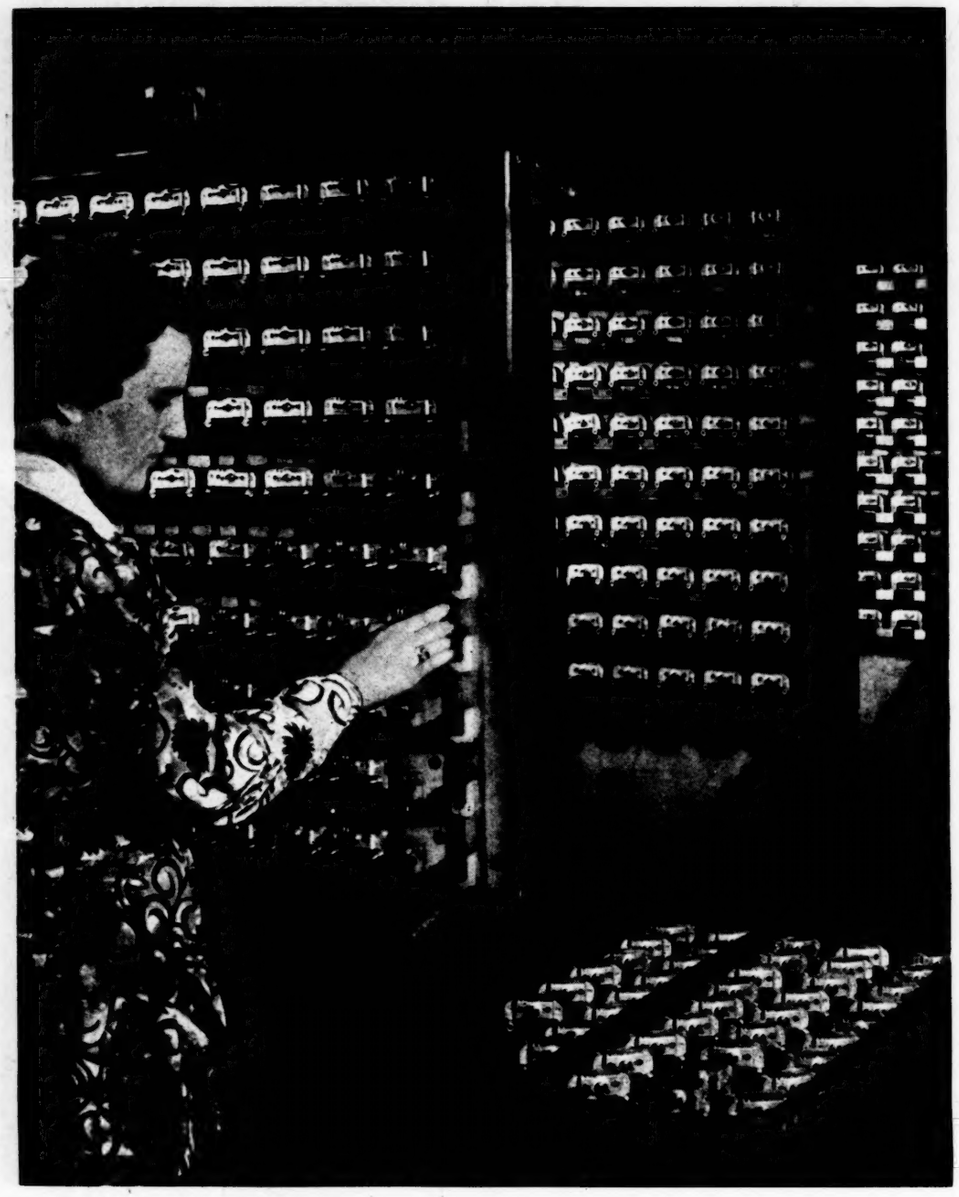
Louis Allis Adjustable Speed Motor

NAME—Adjusto-Spede.
PURPOSE—For driving equipment at variable speeds.
FEATURES—Motor is a combination of an eddy current clutch and a standard constant speed a.c. squirrel cage motor. There is no mechanical contact between the driving and driven members of the unit and the speed and torque variations are obtained by controlling the magnetic excitation of the clutch. The manufacturer states that the following functions can be performed by this unit without jar, shock or stress: Gradual or quick acceleration of the loads, rapid intermittent starting and disconnecting load, absorbs torsional impulses and vibrations, continuous operation at low speeds, and wide range of speed variations from zero to full speed at full load torque.
MADE BY—*The Louis Allis Co., Milwaukee, Wis.*

ALL SE
ESSEN
CONTROLS AN



The Manufacture of
Barber-Colman Temperature Control Equipment



Running-in Electric Motors
to assure
Proper Operation and Durability

Rockford **Barber-Colman Company** *Illinois*

Control Innovations, Test Kits Feature 1939

NEW controls and instruments for this field were announced in numbers comparable to those experienced in recent years. Considerable shifting about of the dollar volume of sales among the several manufacturers was reported—probably to a greater extent than has been the case for some time. There were indications that on a good many items the steady lowering of prices which has gone on for so long a period has so drastically changed the profit margin that merchandising methods and quantity production are an absolute necessity. This applies generally to the older items, but the development of new items continues to offer attractive possibilities. There is no indication of any slacking at all in the basic demand for automatic operation through controls. So also do measuring, testing, and checking instruments continue to find a steadily broadening field of usefulness in this industry.

Statistics

Although this year was marked, statistically, by a great expansion of reported data on summer air conditioning equipment sales, such expansion did not, unfortunately, extend to the point of making available any figures whatever on the sales of controls and instruments required in connection with heating, ventilating or air conditioning. Figures from the Census of Manufactures, which is made bi-annually, and now available for 1937, give production figures on controls, but unfortunately they are bulked with controls for cooking apparatus, such as oven regulators. Consequently, no detailed statistics on controls appear on this page.

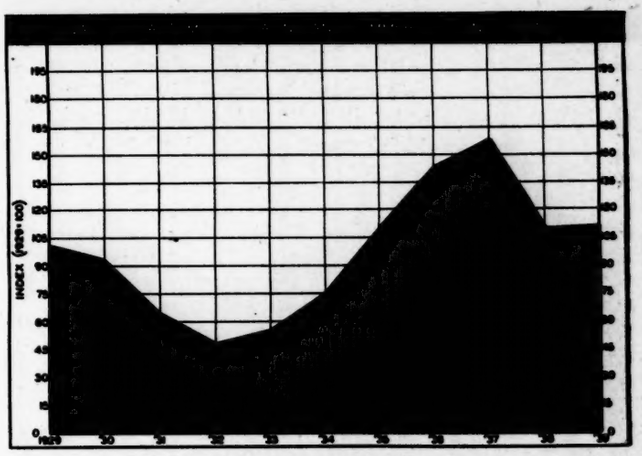
However, it seems safe to assume that the greater part of the volume of the control business of manufacturers serving the heating and air conditioning industry is for three rather distinct applications: automatic heating jobs, such as oil and gas installations; summer air conditioning, and commercial refrigeration. Since the last group is not within the scope with which we are concerned here, it is believed that the trend of the combined volume of summer air conditioning and automatic heating approximately represents the trend of the control business.

In order to arrive at a measure of the volume of these combined businesses it is necessary to convert them both to a comparable unit, and the dollar is the simplest such unit. The accompanying graph, Chart 28, is a plot of this dollar volume, estimated, of the combined business in automatic heating and summer air conditioning.

Although the physical volume of both businesses improved in 1939 over 1938, the price structure was still not quite satisfactory and the graph reflects what is believed to be at least a rough idea of the situation in terms of value.

Continuing a steady tendency of late years toward kits arranged for convenient handling and manipulation, a goodly number of these put in an appearance. This is especially the case with CO_2 indicators, smoke analyzers, and similar instruments which are now so generally used for field testing and checking purposes. There are now so many conveniently arranged field kits that there is no reason why any field man now has to be without them or has to find their use a handicap under field conditions.

Interest in control from outside temperature with arrangements to secure any desired difference between outside and inside was reflected through several new controls arranged with this point in mind. Several controls appeared which make use of radio tubes in the electric circuit while applications were reported of photo-electric cells to detect the presence of smoke in air ducts. Of interest also is a method, and necessary controls, for regulating the flow of liquid refrigerant to coils; appearance of several sound measuring and analyzing instruments; and of mixing devices for use with waters of two different temperatures in order to secure a mixed water of fixed temperature. With so many useful devices putting in an appearance it is not possible to single out all of them for mention; instead the following pages offer a fuller record and it is suggested that each item is well worth careful consideration.



28 **An estimate of the total annual value of business in automatic heating and summer air conditioning relative to 1929 = 100. This chart is presented with the idea that both of these businesses are relatively new in recent years and have a trend distinct from that of straight winter heating.**

Friez Air Meter

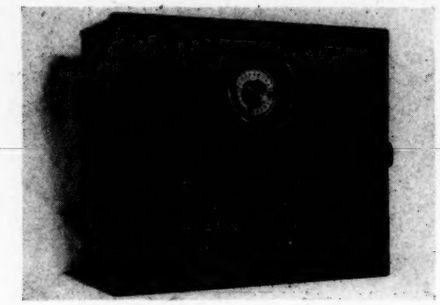
NAME—Friez direct reading, portable Airmeter.
PURPOSE—For the measurement of static air pressures from 0 to 0.3 in. of H_2O, air velocities from 300 to 2000 f.p.m., and stack drafts directly from a pointer and graduated scale.
FEATURES—Instrument was developed to meet the needs for an easy to use instrument for determining static pressures, air velocities, and stack drafts at a glance. Airmeter is of the diaphragm type and uses no liquids. It has a pressure range from 0 to .3 inches of water. The velocity scale is unique in that it is divided into 4 banks, each calibrated for a typical air temperature (0F, 70F and 200F). Readings at other temperatures can be interpolated over a range from 300 to 2000 ft. per min. The pilot static head, which is offered for use with the airmeter, is so designed that it may be held as much as 12° out of line with the true direction of air flow without introducing any error. When not in use, the airmeter is protected by a steel slip-over cover.
MADE BY—*Julien P Friez & Sons, Baltimore, Md.*

Pioneer Tank Heater Control

NAME — Pioneer tank heater control.
PURPOSE — For controlling temperature of water heated by solid fuel-fired water heaters.
FEATURES — Device consists of a thermostat and a flue pipe damper. The thermostat is attached either to boiler or hot water return pipe and causes the damper to open or close to maintain the proper temperature.
MADE BY—*The Pioneer Regulator Division of The Master Electric Co., Dayton, Ohio.*

Fischer-Smith Heating Control

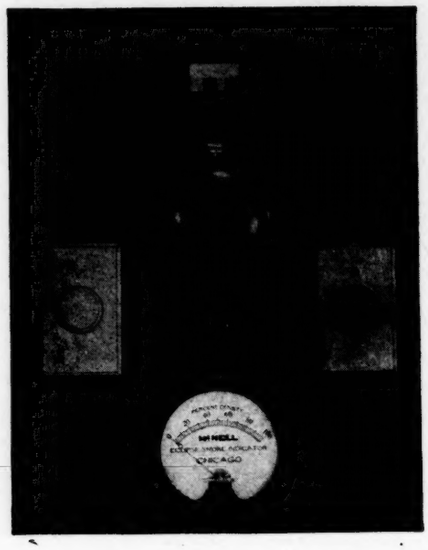
NAME—Fischer-Smith electronic heating control.
PURPOSE—For the control of steam or hot water heating systems.
FEATURES—Control consists of an outdoor element, a radiator element, a control panel, and the necessary motor operated valves or switches for controlling the heat. The outdoor element measures the demand for heat, as it is affected by the temperature, wind



and other outside conditions, while the radiator element measures the heat input to the building. Whenever the demand is greater than the input, the control box calls for more heat and whenever the demand is less than the input, the control box calls for less heat. The control elements are simply resistance wires which change their resistance with the temperature. A modified bridge circuit measures the resistance of each element and whenever they differ a relay is operated to turn the heat on or off. Radio tubes are employed to amplify the current so that it can operate the relay. The manufacturer claims the following outstanding features: Extreme sensitivity· only one moving part—the relay; low voltage control wiring; applicable to any radiator heating system to provide modulating, impulse or cycling control; responds to wind; inexpensive. Controls are furnished with adjusting knobs to adapt the control to a particular building and to give rapid heating up periods. They also may be obtained with a program clock to give a night cycle, heating up cycle and normal cycle.
MADE BY—*Fischer-Smith, Inc., West Englewood, N. J.*

McNeill Smoke Indicators

NAME—Smoke Indicating Systems.
PURPOSE—For indicating and recording smoke conditions and to serve as a guide to economical boiler operation.
FEATURES—A complete line of smoke indicating systems for indicating and recording flue gas conditions. Instruments employed may either be of the periscopic type or electrical type. The periscopic type of smoke indicating



instrument consists of a light unit mounted on one side of the breeching, a sight window on the other side, and reflecting elbow pipe and a vision unit, which makes it possible for the fireman to observe flue gas conditions through the breeching window. The electrical type of smoke indicating instrument utilizes the light unit mounted on one side of the breeching and a light sensitive box on the other side. This light sensitive box may be used to operate a smoke density indicator which shows density in Ringelmann numbers, an audible alarm, red and green visual alarms, or any combination of these. The red and green lights may be operated so that the green light shows the probability of excess air and the red light objectionable smoke. The light sensitive box may also be used to make a permanent record of smoke conditions or of the time of duration of the period when the boiler is making smoke of objectionable density.
MADE BY—*T. W. McNeill Engineering Equipment Co., 4057 W. Van Buren St., Chicago, Ill.*

Air Conditioning Supply Valve

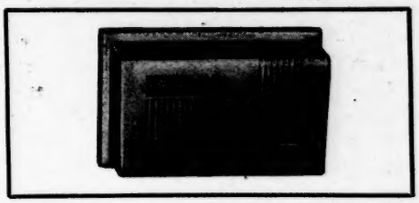
NAME—Topsy Top-seat valve.
PURPOSE—For controlling the water level in humidifiers, evaporative condensers, and other equipment.
FEATURES—Valve consists of a float, rod, rocker and valve seat. Valve is designed to permit the use of orifices of various sizes so that it is adaptable to a wide range of pressures and capacities. Interchangeable gaskets make it possible to adapt the valve to control various fluids at various temperatures and pressures. The orifice can be cleaned by withdrawing a cotter pin.
MADE BY — *Air Conditioning Supply Co., Cleveland, Ohio.*

Friez Thermo-Anemometers

NAME—Friez Thermo-Anemometers.
PURPOSE—For measuring air velocities from 10 to 6000 ft. per min.
FEATURES — Instrument is suitable for use in open air, in front of grilles or registers and in ducts. It consists of a pair of accurate thermometers, 2 rheostats, a voltmeter, 4 small dry cells providing 6 volt current and the necessary connecting wire. A coil is wound around the bulb of one of the thermometers and is connected in series with the batteries and the rheostats which vary the voltage to the heater coil. The instrument operates on the principle that the air velocity being measured lowers the temperature of a heated thermometer, and the difference in temperature between the heated and unheated thermometers varies with the air velocity. The instrument is compensated for variations of temperature, humidity, radiant heat and self-generated convectional currents. Instrument is furnished with a small graph in the lid of the case, as well as a large graph on which is an equation for the individual instrument. Velocities may be obtained conveniently and rapidly from the small graph. If, however, greater accuracy is required, the use of the large graph is recommended, and if extreme accuracy is necessary, the equation is used.
TYPES AVAILABLE—Thermo-Anemometer A/50 temperatures 0 to 120F. A/51 for 50 to 200F. A/52 for 50 to 300F.
MADE BY — *Julien P. Friez & Sons, Baltimore, Md.*

M-H Thermostat

NAME AND MODEL NO.—Grad-U-Stat TO900.
PURPOSE—A pneumatic thermostat for room temperature control.
FEATURES—Manufacturer states that this thermostat brings to the pneumatic control field the greater sensitivity, modern appearance, and improved results which have been available in electric thermostats for several years. Model is of the non-leak type and uses air only when it is changing the position of an air motor or valve. It is said that the quantity of air used, therefore, is very small and a compressor size is reduced by about 80%. The thermostat is horizontally mounted which results in the free flow of air over the low-mass sensitivity bellows because there is no restriction to the flow of air except in the grille work in the cover. This free flow is said to make the thermostat extremely sensitive. A single model of the Grad-U-Stat may be used as a direct or reverse acting thermostat and the throttling range of differential may be adjusted between comparatively wide limits. Sub-master, day-night, and summer-winter models are available through the addition of a small unit to the standard instrument. The manufacturer states that the instrument is capable of controlling twice as many damper motors and valves as the present thermostat and it is tamper proof since most of the operating mechanism is located behind the thermostat in the wall.
MADE BY — *Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.*

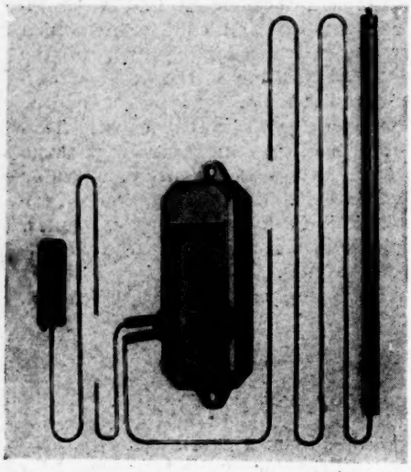


Penn Damper Control

NAME AND MODEL NUMBER—Draftender damper motor, Type 910.
PURPOSE—For opening and closing draft and check dampers on hand-fired heating furnaces.
FEATURES—Motor is a brushless shaded coil transformer type motor which provides electric operation in both directions from a simple two-wire pilot or thermostat control. It is designed to be used with the standard Penn Temptrol. In place of the conventional operating arm, this motor uses a cut sprocket gear which transmits the power to the dampers by means of a sprocket chain. Motor includes an external coil spring which gives positive spring return to the check-fire position in the event of current failure, the opening of a line switch or for any other cause. This motor is offered in standard package sets for all types of furnace and boiler installations. Sets include Penn Temtrol, limit switches, and wire, staples, pulleys, hooks, return spring and furnace chain.
MADE BY—*Penn Electric Switch Co., Goshen, Ind.*

Taylor Hygrometer

NAME—Taylor Hygrometer.
PURPOSE—For indicating the dry and wet bulb temperature of the air in ducts, dryers, and other closed compartments.
FEATURES—Instrument is so designed that all parts are readily accessible for installation and routine servicing. By loosening two thumb screws the complete assembly swings out on a triple-hinged bracket. To increase the efficiency, the wet and dry bulbs have been staggered and can be used either in horizontal or vertical ducts. A skeleton guard around the bulbs prevents breakage and is so designed as to have no heat capacity to alter the temperature of the air around the bulb or to hinder the free circulation of air. The thermometer stems have the scales etched to give easy reading. The required opening in the duct for installation is 8 x 2¾ in. In operation water is supplied the wick by filling the water bottle and inverting it in the bottle holder which is designed to take the regular stubby beer bottle. When a pressure of more than ½ in. of water makes the bottle-fed hygrometer impractical, there is available a hygrometer with a constant level reservoir. Space required for installation of this is 4 x 8 in.
MADE BY — *Taylor Instrument Companies, Rochester, N. Y.*



Thrush Temperature Control

NAME & MODEL NO.—Thrush Differential temperature control, No. 210.
PURPOSE—For controlling the operation of forced circulation hot water systems in accordance with both inside and outside temperatures.
FEATURES—Control is said to automatically secure a balancing of indoor and outdoor temperatures. When heat is required control operates the circulator which sends additional heat into the building. When used on large buildings, one or more sections may be zoned, giving a better operating efficiency.
MADE BY—*H. A. Thrush & Company, Peru, Indiana.*

Electrical Research Noise Analyser

NAME—Industrial noise analyser.
PURPOSE—For detecting flaws in running machinery.
FEATURES—Device measures the intensity of sound at any preselected pitch and turns a deaf ear to all other noises. Should there be any variation from the normal sound frequency intensities, the dial warns the operator that his machine is defective and may "freeze up" or break down. Analyser consists of 3 parts: a microphone which converts the noise produced by the product under test into electrical impulses, electrical wave filters which pass from the microphone to the amplifiers only the frequency bands of the squeaks or hums which occur when a faulty product is tested, and an amplifier and a meter which gives visual indication of the power level in the band being passed. Manufacturer states that possible uses of the noise analyser are almost limitless in testing and checking electrical motors, anti-friction bearings, compressors and gear units.
MADE BY—*Electrical Research Products, Inc., 195 Broadway, New York.*

Kieley & Mueller Liquid Level Controller

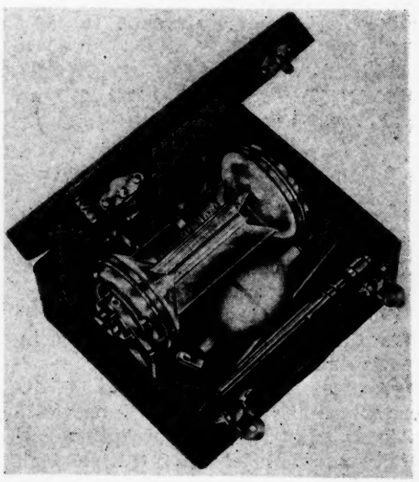
NAME—Liquid level controller.
PURPOSE—For automatically controlling liquid levels.
FEATURES—This line of liquid level controllers is manufactured in floats from 6 to 12 in. Bodies may be of cast steel, semi-steel, alloy steel, and other special construction including a special method of lead lining for acid services. The ball bearing stuffing box construction is novel in that the packing is completely removable from the stuffing chamber without breaking the connection of the box in the float chamber and thereby maintaining true alignment on the float shaft at all times. The manufacturer states that there is almost complete lubrication on the shaft and that there is a minimum of metal to metal contact, thereby reducing frictional loss. It is said that these float chambers are being constantly used in operating up to a 2-in. valve directly connected to a 6-in. float.
MADE BY—*Kieley & Mueller, Inc., 40 W. 13th St., New York, N. Y.*

Weaver Heating Plant Analyzer

NAME—Heating plant analyzer.
PURPOSE—For analyzing combustion performance of domestic and commercial heating plants.
FEATURES—Instrument is a 3-in-1 unit that gives readings of stack draft, temperature and flue gas analysis. All three instruments operate from dry cells contained within the case and all three readings are simultaneous and continuous as long as gas sample is passed into the analyzer by the bulb aspirator. The temperature gage is an electric thermocouple with a range from 0 to 1000F. The stack draft gage is electrically operated and gives readings in hundredths of an inch of water, from 0 to 5/10 in. and the fuel gas analyzer operates on the Wheatstone Bridge principle to show the per cent of carbon dioxide by the thermal conductivity method.
MADE BY—*Weaver Manufacturing Co., Springfield, Ill.*

Hotstream Flue Gas Kit

NAME—Hotstream flue gas kit.
PURPOSE—For determining stack temperatures, carbon dioxide content of flue gases and draft.
FEATURES—Flue consists of a vest pocket draft gage, a small carbon dioxide analyzer and a stack thermometer. In using the analyzer, the carbon dioxide sample is pumped into the gas chamber through an aspirator bulb, the sampling hose is detached which seals the unit and the gas mixed with absorption fluid by merely turning the unit upside down. When it is returned to a normal position, the suction created by the absorbed CO_2 pulls the fluid into a graduated tube which indicates the percentage of volume absorbed. The price is $23.40.
SOLD BY—*Hotstream Heater Co., 8007 Grand Ave., Cleveland, Ohio.*



MUST BE CONSIDERED

Engineering

Mechanical

Adequate ★

★ ADEQUATE CONTROL—A COMPLETE CONTROL SYSTEM COORDINATED TO PRODUCE THE DESIRED RESULTS. EITHER ELECTRIC, PNEUMATIC OR A COMBINATION OF BOTH AS THE [illegible] DEMAN[illegible]

MINNEAPOLIS-HONEYWELL *Control* SYSTEMS

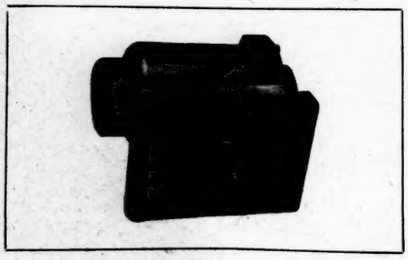
THE MODUTROL SYSTEM OF ELECTRIC CONTROL
THE GRADUTROL SYSTEM OF PNEUMATIC CONTROL
BROWN INSTRUMENTS FOR INDICATING AND RECORDING

Simplex Air Filter Watchman

NAME—Electric Filter Watchman.
PURPOSE—To indicate when air filters are clogged to the extent that they should be cleaned or replaced.
FEATURES—Device is primarily a bellows-operated electric switch which is mounted on the outside of the conditioner at any point between the filters and blowers. By a simple adjustment the Watchman may be set for any desired pressure drop through the filters. Any excess pressure depresses the bellows of the instrument, making an electric contact to light a red signal. The signal continues to burn until the filters are removed or cleaned.
MADE BY—*Simplex Controls Div. Herbusch Corp., Title Guaranty Bldg., St. Louis, Mo.*

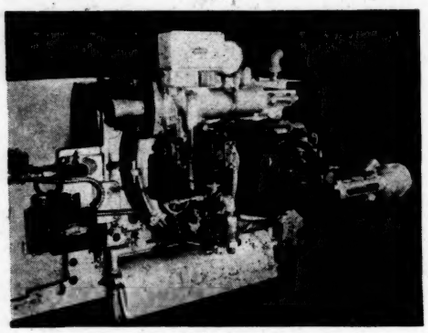
Bell & Gossett Watermixer

NAME—B & G Watermixer.
PURPOSE—An adjustable tempering valve for mixing cold and warm water to get water at desired temperature.
FEATURES—Watermixer utilizes a bimetal coil submerged in the mixed water to open and close a balanced valve. The manufacturer states that the valve is so constructed that the differences in pressure throughout do not affect its operation and that the temperature of the outlet water remains constant for any rate of draw within the capacity of the valve.
SIZES AVAILABLE—½, ¾, and 1 in.
MADE BY—*Bell & Gossett Co., Chicago, Ill.*

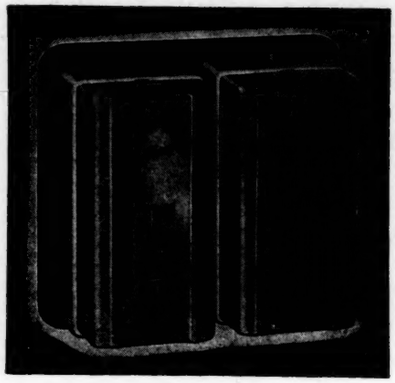


Todd Rotary Oil Burner Control Types P.A.H. and P.A.

NAME AND MODEL NUMBERS—Todd rotary fuel oil burner, Types P.A.H. and P.A.
PURPOSE—For burning any commercial type fuel oil under fully automatic control for heating schools, apartment houses, small buildings, hotels, office buildings, factories, and similar buildings.
FEATURES—While the basic principles of the rotary burner have been retained, this model has been completely redesigned and proportioned to allow ample clearances and generous air and oil passageways to promote quiet and efficient operation. The burner unit is arranged in combination with an integrally driven oil pump and control devices so that it is provided with completely built-in equipment for proper handling and treatment of the heaviest grades commercial fuel oil. Where the application does not justify the use of heavy oil requiring preheating, the burner is furnished basically as for heavy oil application but without such equipment as is essential for temperature control of the heavier oils. This feature



makes it possible for conversion to heavy oil operation simply by adding the extra equipment. Gas-electric ignition is provided as standard equipment upon all a.c. powered burners and control of the burner under full automatic operation may be from either a temperature limit source or from a pressure control. The relay equipment incorporated as standard equipment with the burner is the new Minneapolis-Honeywell Regulator Co. Type R-157-1 which provides post ignition and recycling features. This relay permits a flame failure to occur once without the relay locking out on safety and provides for a scavenging period of approximately 3 min. after the initial flame failure before recycling the ignition sequences. The illustration shows the Type P.A.H. rotary fuel oil burner.
MADE BY—*Todd Combustion Equipment, Inc., New York.*

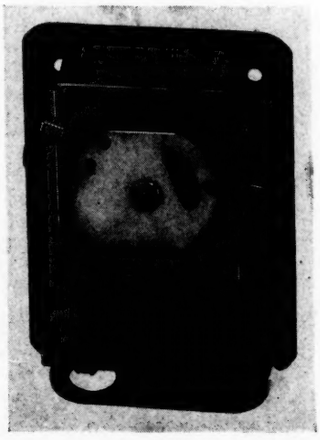


Au-Temp-Co Dual Assembly

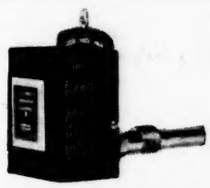
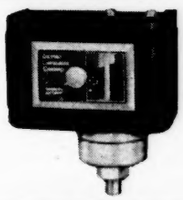
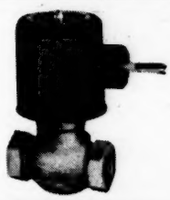
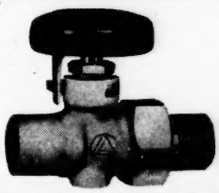
NAME—Au-Temp-Co combination thermostat and humidistat assembly.
PURPOSE—For use where combination thermostats or humidistats are required.
FEATURES—This dual assembly unit for use with combination thermostats and humidistats employs a sturdy metal cover finished in harmonizing dull antique silver. The base is constructed of polished ebony. Either positive acting, modulating, or floating type thermostat or humidistat can be used with this assembly. The dimensions of the cover are 1⅝ in. deep, 2 in. wide and 4 in. high.
MADE BY—*Au-Temp-Co Corp., 1 Park Ave., New York, N. Y.*

Mercoid Stoker Timer

NAME AND MODEL NUMBER—Mercoid Type THV Stok-A-Timer.
PURPOSE—For maintaining stoker fires during periods when the thermostat does not call for heat.
FEATURES—The distinguishing feature of this control is the heat motor which operates a gearless mechanism having one rotating member that turns at a rate of 1 r.p.h. Control requires no lubrication and has an electrical capacity of 10 amperes at 115 volts, 5 amperes at 230 volts.
MADE BY—*The Mercoid Corp., Chicago, Ill.*



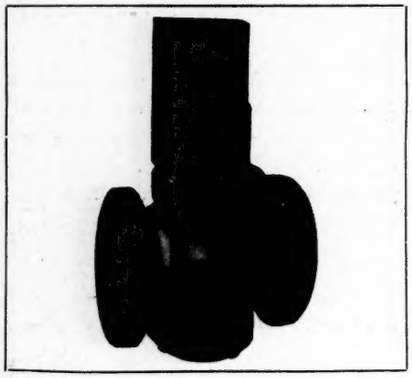
"Genuine Detroit" CONTROLS

WHAT IT IS	WHERE IT IS USED	WHAT IT DOES
No. 300 Multiport Air Valve	Used on all radiators of one pipe steam systems, new and old.	It vents air in radiators and adjacent risers faster than any other available valve—venting rate may be regulated to balance venting on all radiators of the system.
No. 861 Hurivent Valve	Used on mains of one pipe steam systems, both new and old.	The 861 is a vital part of the Ideal Fast-Venting System which includes the No. 300 Multiport for all radiators. The No. 861 with ½" port vents the mains immediately steam is generated.
Two-Eleven Thermostat	Used in control circuit for heating and air conditioning installations.	Controls the operation of burner motor, solenoid valve, damper motor or Thermotor gas valve in accordance with changes in room temperature—available with or without preheater.
No. 653 Immersion Control* 	A low voltage control that is usually wired in parallel with the low voltage thermostat.	Controls burner in accordance with changes in water temperature to provide summer and winter domestic hot water. *Licensed under Taco-Abbott System patent.
No. 450 Pressure Control 	A line voltage unit for use with oil burners, gas burners and stokers.	Controls operation of stoker or burner motor in accordance with changes in boiler pressure. Hot water and warm air types also available.
No. 683R3-W3 Solenoid Valve 	Installed in the liquid or suction line of refrigerating units or in water supply lines.	Controls the flow of refrigerant or the flow of water in response to the action of thermostat, pressure switch or humidistat.
No. 217-A Circulator Valve 	On circulated hot water heating systems.	A shut-off valve which permits minimum leakage at all times to prevent radiator freezing at low temperatures but not enough flow to cause overheating in shut-off position—sweat connection for copper pipe. Models for gravity and circulated hot water.

DETROIT LUBRICATOR COMPANY

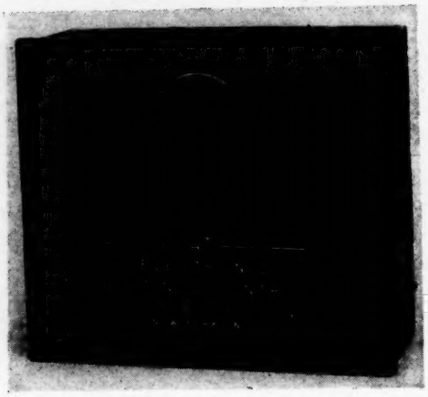
Au-Temp-Co Control Valves

NAME—Au-Temp-Co improved motorized control valves.
PURPOSE—For two-position or modulating service in the control of steam, air, gases and liquids or for zone control of heating systems or for various ventilating and air conditioning applications.
FEATURES — Valves are offered in more than fifty types to meet a complete range of high and low applications and are available in two designs, (1) the motor mounted above the valve and (2) the motor mounted on the side of the valve. The manufacturer states that the compact assemblies permit installation in close quarters and that the moving parts are reduced to a minimum. The valves are motivated by an Au-Temp-Co Type ML reversing split-phase motor which operates in any position and in any direction. Made in either screwed or flanged type.
MADE BY—*Au-Temp-Co Corp., 1 Park Ave., New York.*



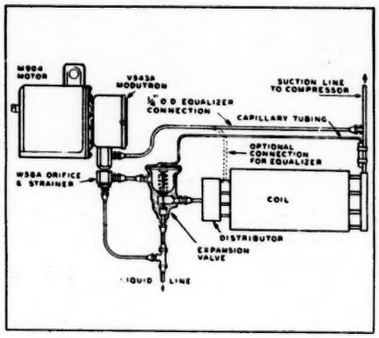
Herske & Timmis Heating Control

NAME—HT automatic heating control.
PURPOSE—For the control of steam heating systems in multi-occupancy buildings using either oil burners, stokers or gas burners.
FEATURES—Control is mounted in a steel cabinet which is fastened to wall in boiler room or wherever desired in building. It is connected to the pressure switch, line current and the firing device. In the control box is a weather-comfort dial which the building custodian sets in accordance with the weather.
METHOD OF OPERATION—When operating on the weather-comfort control dial the control starts the firing device and keeps it on until the pressure switch is satisfied, at which time the firing device is stopped. The cut-off point of the pressure switch is set at whatever pressure will cause circulation of steam to all radiators. After the pressure switch is satisfied the control keeps the firing device off for a period determined by the weather-comfort control dial. These delayed off periods are 10, 15, 20, 25, 30, 40, 60 and 120 minutes. The colder the weather the shorter the off period, the warmer the weather the longer the off period. The weather-comfort control dial is marked with weather indications so that the operator can easily choose the correct setting. A clock switch automatically turns off heat at any desired hour at night and turns it on again to full heat under control of the presure switch at any time in the morning. At the end of the heating up period, which can be of any desired length of time, control is restored to the weather-comfort control dial.
MADE BY—*Herske & Timmis, Inc., 33 W. 60th St., New York, N. Y.*



M-H Air Conditioning and Control System

NAME—M-H Modutron system.
PURPOSE—For modulating the flow of liquid refrigerant to cooling coils.
FEATURES — The Modutron system may be applied to any refrigeration installation employing a thermostatic expansion valve with an external equalizer. A small electrically operated valve, known as the V543 Modutron, is installed in the equalizer line of the thermostatic expansion valve. The electric motor which operates the valve is modulated by temperature, humidity, pressure or any other condition to be controlled and opens the valve wide when maximum cooling is required. Under these conditions, the refrigeration system operates in a normal manner. When less refrigerating effect is required, the electric motor moves the valve to a more closed position, reducing the effect of the external equalizer on the expansion valve. As a result the expansion valve operates at a higher super-heat. When the Modutron is completely closed, the expansion valve is affected only by the pressure of the refrigerant leaving the valve, and on most systems, the capacity will then be reduced to about 60% or 70% of full load capacity.
On jobs requiring further reduction of capacity, the W 58 orifice may be added. This orifice bleeds a small constant quantity of liquid into the pressure chamber of the expansion valve from the liquid line. The addition of the W 58 orifice to the V 548 Modutron gives modulation from full capacity down to between zero and 20% depending upon the characteristics of the expansion valve.
The manufacturer states that since the capacity reduction is secured without changing the air velocity over the coil, it is possible to modulate to a lower suction pressure than otherwise without danger of frosting the evaporator.
MADE BY — *Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.*



Sarco Temperature Control Valve

NAME AND MODEL NUMBER—Self-contained electric temperature regulator, type SE.
PURPOSE—For regulating the supply of heating medium to maintain any temperature between 40 and 650F.
FEATURES—Valve is of the throttling type and is said to adjust itself automatically to any position between wide open and closed. The sensitivity of the regulator is adjustable in use. Each regulator may be calibrated at the factory for any desired temperature between — 40 and 650F and is then adjustable in the field for 50F higher or lower than factory calibration. Standard valves from ½ to 2 in. have a bronze body, stainless steel trimmed, and union connections. Valves 2½ to 4 in. are iron body, bronze trimmed; sizes 2½ to 3½ in. are screwed; 4 in., flanged. Regulators may be connected directly across the line to operate on single phase a.c. current, 110 or 220 volts.
SIZES—From ½ to 4 in. pipe size.
MADE BY—*Sarco Company, Inc., New York, N. Y.*

FOR CUSTOMER SATISFACTION

On any heating, air conditioning, or refrigeration installation Penn-Built Controls give positive assurance of *accurate* performance, *dependable* operation. Equipment manufacturers choose controls by Penn because they meet the most exacting standards of their engineers, and the most gruelling tests of actual service. Dealers and service men, responsible to the final users, likewise favor Penn controls for trouble-free operation, and that most valued asset in business—*satisfied customers.*

AND DEALER PROFIT

Penn's outstanding engineering advances have been toward greater simplicity in structure and hence more dependability in service. Designed with the service man's problems in mind they save installation time... profitably cut installed costs.

Built to serve and not to service, Penn controls safeguard the dealer's profit through the period of service responsibility, and go on operating dependably through the years. Penn's thorough program of dealer training schools has shown the way to more profitable installations and better satisfied customers.

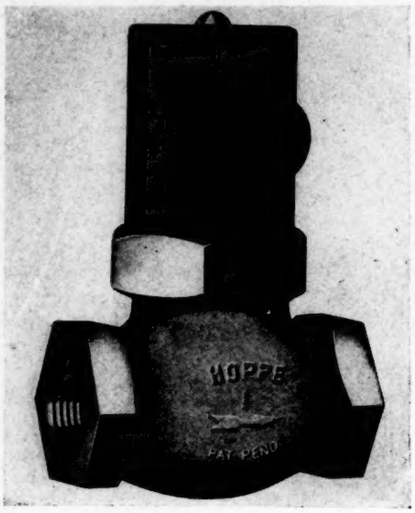
Specify Penn-Built Controls for automatic heating, air conditioning, refrigeration, pump and air compressor applications.

Every modern facility for engineering research and precision manufacture is afforded in Penn's new plant. Here Penn engineers develop new controls to meet the rapidly advancing needs of automatic equipment manufacturers... devise new tests to check the accuracy and dependability of Penn products. Penn workmen build with hair-line precision to meet the exacting requirements of Penn's rigid inspection service.

Penn Electric Switch Company, Goshen, Indiana. Branches in Principal Cities. Export: 100 Varick Street, New York City. In Canada: Powerlite Devices, Ltd., Penn Electric Switch Division, Toronto, Ontario.

PENN

At the Sixth International Heating and Ventilating Exposition Lakeside Hall, Cleveland. January 22-26. Booths—55 and 57



Hoppe Electric Valve

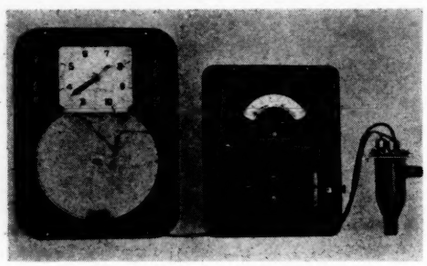
NAME—Hoppe electric valve.
PURPOSE—For controlling the flow of Freon, methyl chloride, sulphur dioxide, brine, air, oil, water, steam, and ammonia.
FEATURES—It is said that this valve is absolutely tight closing and has soft discs and seats on both the main valve and pilot valve. All seats and discs are standard and removable. Coils are impregnated to resist moisture and are designed for constant service. Valve weighs 4¼ lb., height overall 5¾ in., length 3¾ in. Valve is said to consume 7 watts operating on 250 lb. pressure and 15 watts operating on 400 lb. pressure.
MADE BY—*A. F. Hoppe Engineering Inc., 246 S. Meridian St., Indianapolis, Ind.*

Allen-Bradley Push-Button Control Station

NAME—Bulletin 800 push-button control station.
PURPOSE—For controlling the operation of electrical equipment.
FEATURES—The enclosure of the new push-button stations consists of a reinforced bakelite cover mounted on a die-cast frame. This cover is furnished in black as standard, but may be provided in machine tool gray or in white. By removing a single screw, the cover can be taken off, exposing all terminals. Buttons are of molded red and black bakelite and are available with various markings engraved on them. The push-button stations are available in both horizontal and vertical arrangements and have a maximum rating of 3 amperes, 110, 220, 440, 550 volts.
MADE BY—*Allen-Bradley Co., Milwaukee, Wis.*

Bristol pH Recorders and Controllers

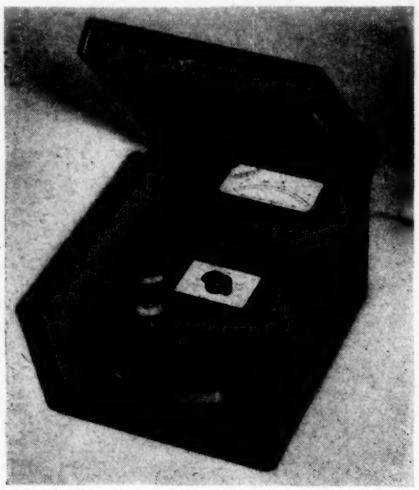
NAME—Bristol pH recorders and controllers.
PURPOSE—For measuring pH value of fluids.
FEATURES—Shielded glass and Calomel electrodes are used for measurement and control. Two types of electrode assemblies are offered, (1) the enclosed flow type (solution under measurement is pumped or allowed to flow through the chamber) and (2) an immersion type (designed for immersion in tanks and vats). Electrodes



are of such a size that they are conveniently handled and are rugged enough so as to require no special handling precaution. It is said that they can be used in either viscous or semi-solid substances and in rapidly circulating or flowing liquids. Temperature changes are automatically compensated for. Recorders are offered in two general types, wide strip-chart model and the round-chart model, while automatic controllers are offered in both electric and air-operated models.
LITERATURE AVAILABLE—Bulletin 536.
MADE BY—*The Bristol Co., Waterbury, Conn.*

Meck Instruments Sound Level Meter

NAME—Pattern 15 Soundmaster.
PURPOSE—For measuring sound intensity.
FEATURES—Instrument consists of a calibrated microphone and specially designed amplifier housed in a portable carrying case. It requires no external power source and is said to be adaptable for both laboratory and field work. The range of measurements is from plus 50 decibels to plus 150 decibels, in steps of one decibel each.
MADE BY—*John Meck Instruments, 164 N. May St., Chicago, Ill.*



Marsh Recorder

NAME—Marsh Serviceman recorder.
PURPOSE—A compact recording thermometer or pressure gage.
FEATURES—This device can be used to record temperatures between 45 and 90F or 15 and 60F and pressures from 0 to 10 lb. A bimetallic spiral is used in the temperature recorder and a bourdon tube is used in the pressure recorder. The chart is rotated by a fully adjustable clock movement, wound by a knob extending through the back of the case. The pen arm has a friction hinge which permits it to be swung clear of the chart for chart replacement. The recorder is housed in a smooth cast-aluminum case with a satin black with chrome bevel finish. Included with the recorder are 100 charts and a bottle of ink.
MADE BY—*Jas. P. Marsh Corp., Chicago, Ill.*

"ACCURATE REGULATION OF STEAM TO ATOMIZING BURNERS *means* MONEY SAVING"

Case No. 319

STRAIGHT LINE FLOW ELIMINATES TURBULENCE . . .

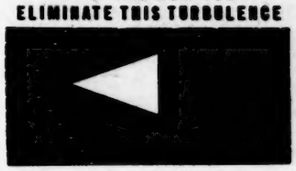
Gets

HIGHEST VALVE CAPACITY

From inlet to outlet the fluid flows through this valve in a straight line — a streamline — almost as though there were a pipe running through the valve housing for the fluid to flow through. There is no detour around a dividing wall—the direction of flow is not changed at right angles because of a seat wall — also, the flow is not broken up by valve stems, springs, or other parts. The net result is NO TURBULENCE, hence MORE CAPACITY.

SHOWING HOW THIS VALVE INCREASES PERFORMANCE RESULTS BY ELIMINATING TURBULENCE . . . .

. . . . AND HOW YOU ELIMINATE THIS TURBULENCE



Because of the streamlined flow, you are easily able to meet peak demand and yet hold the pressure constant at the same time. You get abundant flow when you need it most. No turbulence is set up and therefore operation is smoother—you have no pressure variation—you have constant, dependable action—you experience no spoilage results due to turbulence.

Statements from Streamlined (Type 1000) Valve users have come to us from all parts of the country—these verify the fact that this modern Streamlined Valve has no complicated parts to get out of order—no small ports or passages to clog up—nothing to keep it from working dependably—that you are easily able to meet peak demand and yet hold the pressure constant at the same time—that you really get high capacity flow when you need it most.

For example Case No. 305 says: "We are getting a better and more uniform product because our processing equipment is functioning better than ever before due to the even control the '1000' Valve is giving us. We also like the large capacity it is giving us."

Case No. 318 says: "Yes Sir! It's easy to say nice things about your Streamlined Valves. We like them very much. They have a whale of a lot of capacity. They control the reduced pressure within exceptionally close limits. They require NO maintenance—and I do mean 'NO!'."

The high pressure entirely confined to the small inlet chamber (cross hatched section) makes this valve good for initial pressures up to 3,000 lbs. The valve is furnished in sizes from ¼" x ¼" up to 2" x 2½" inclusive. For delivery pressures below atmosphere, a special diaphragm spring arrangement is used

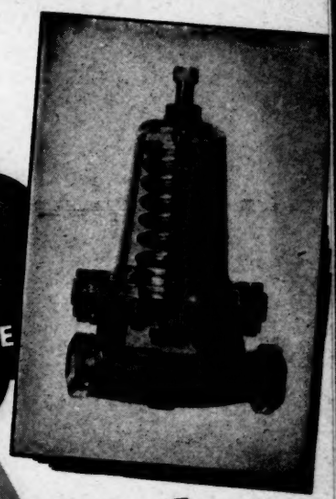
SEND FOR BULLETIN 1000

30-DAY TRIAL *Free* OFFER

Write for details on this special offer made to give you an opportunity to find new ways to save money

* "Regarding your Streamlined Valves, we use them for atomizing steam to our burners. Correct atomization means money saving. We need the lowest possible friction loss (pressure drop) through the valve that is possible. We need highest capacity possible on low pressure difference across the valve. We need constant delivery pressure from the valve regardless of changes in demand on the valve. Your Streamlined Valves give us these qualities better than any other make we have used. And it may interest you to know that we have found that we can count on your Capacity Charts too."

A *Winner* WINS FIRST PRIZE



PHOTOGRAPH SENT *Free*

Recently we had a Streamlined Valve made of crystal clear plastic (pictured above) as a display piece for our plant.

The fabricator made a duplicate for himself and entered it in MODERN PLASTIC Magazine's Annual Contest.

First prize in the Industrial Parts, Moulded Group was awarded the plastic Streamlined Valve by MODERN PLASTIC Magazine.

We had a few photographic prints made of the Crystal Clear Streamlined Valve on display in our plant. Each of our representatives was given one. These men have found that the picture proved interesting to people they called upon because the entire simple and efficient construction of the Streamlined 1000 Valve is seen.

You may find it interesting to have one of these photos so that you can see the construction that enables straight line flow—so you can see construction that eliminates complicated parts—and that insures, as users say, "lots of capacity and exceptionally close pressure control."

A photograph will be sent you upon request.

A. W. CASH COMPANY
DECATUR, ILLINOIS

CASH STANDARD
CONTROLS . . VALVES

Hays Flue Gas Analyzer

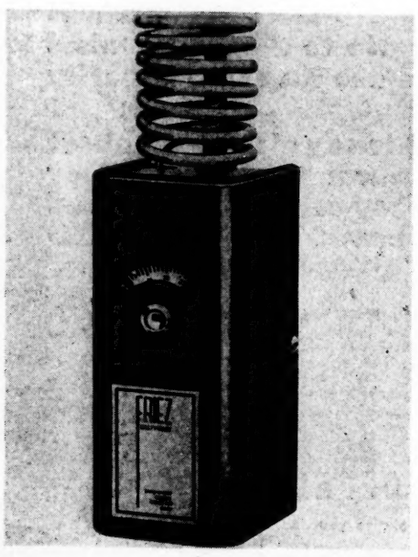
NAME—Orsatomat.
PURPOSE—For automatically analyzing flue gases.
FEATURES — Incorporated in this new model is a transparent plastic tilting analyzing unit, which is said to be smaller, lighter in weight and more compact than the unit in the old model. It is housed in a newly designed streamlined pressed steel case, along with a draft measuring and indicating unit. If desired, a flue gas thermometer may also be fitted inside the case. The Orsatomat may be had simply for analyzing for CO_2 or in a two unit model for analyzing for CO_2 and O_2. Device is portable as it weighs 12 lb. fully charged. It is finished in a grey lacquer with chromium trim.
LITERATURE AVAILABLE — Publication No. 39-366.
MADE BY—*The Hays Corporation, Michigan City, Indiana.*

Bacharach CO_2 Indicator

NAME—Fyrite.
PURPOSE—A small portable instrument for showing the amount of carbon dioxide in flue gases.
FEATURES—Instrument is made from a clear plastic material and is said to be fool-proof in operation. The manufacturer states that there are no valves, clamps or leveling bottle and that a complete analysis takes less than 20 seconds.
OPERATION—A dozen strokes of the aspirator bulb fills the Fyrite gas chamber with the flue gas to be analyzed. The sampling hose is then detached which automatically seals the Fyrite and makes it ready for the analysis. To mix the gas with the absorption fluid, the instrument is turned upside down and then back again to its normal position. This takes about 10 seconds. The suction created due to the complete absorption of the CO_2, pulls the absorbing fluid up in the graduated tube an amount equal to the CO_2 absorbed. The level shows the percentage of CO_2 in the gas. Fyrite is furnished complete with an aspirator bulb, filter, rubber tubing and sampling tubing, all packed in a carrying case which also has room for a Draftrite gage and pencil-type stack thermometer. Kit weighs about 4 lb. and measures 8½ x 7 x 3¾ in.
MADE BY—*Bacharach Industrial Instrument Co., 7000 Bennett St., Pittsburgh, Pa.*

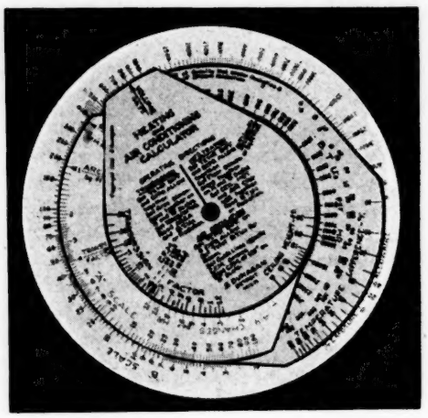
Friez Space Thermostats

NAME—Friez "hydraulic action" self-contained space thermostats.
PURPOSE—For the control of temperature in all domestic and commercial comfort cooling installations.
FEATURES — This line of controls features the hydraulic action principle of operation. It is said that the exposure of the coiled element on top of the case assures great sensitivity. This line of thermostats has a heavy load carrying capacity without the need of relays (25 amperes at 120 volts, 15 amperes at 240 volts.)
MADE BY—*Julien P. Friez & Sons, Baltimore, Md.*



Dunagan Calculator

NAME—Dunagan heating and air conditioning calculator.
PURPOSE—For calculating heat loss or heat gain of rooms, steam or hot water radiator sizes, air supply and fan capacities in warm air systems and air systems for attic cooling jobs.
FEATURES—Calculator is of the circular type, 5 in. in diameter and consists of four celluloid discs. Operating directions are given on the face of the calculator while on the back are various data on transmission coefficients, infiltration losses, exposure losses, design temperature differences and duct losses. In all but one problem all settings are in plain view and can be checked at a glance.
MADE BY—*S. V. Dunagan, 9277 Pinehurst St., Detroit, Mich.*



Minneapolis-Honeywell Motorized Gas Valve

NAME AND MODEL NUMBER—No. V155 motorized gas valve.
PURPOSE—For regulating the flow of gas to burners.
FEATURES—This is a new design of the V15 motorized gas valve. It is equipped with a locking screw which when removed will prevent the occurrence of a hazardous condition if the secondary air damper arm should bind and fail to close. In this event, a latch mechanism will allow the gas valve to close under the command of the thermostat, but will not allow it to open until the faulty damper is repaired. With the locking screw in place, the valve may be opened manually so that the gas burner may be operated during an interruption in the electric power supply. When power supply is resumed the control of the valve will automatically be returned to the room thermostat. Valve is for use with a.c. current only and for gas pressures not exceeding 4 oz.
SIZES AVAILABLE—¾ to 2½ in.
MADE BY — *Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.*

—ALNOR—

DISTANT-READING *Electric* THERMOMETERS

These are moderately priced means for registering temperatures for distant reading at 1000 feet or more—with extreme accuracy. Their applications are ideal in Heating Plants for indicating either outdoor or indoor temperatures, or both—in Air Conditioning installations—in Office Buildings—Hotels—Industrial Plants—Hospitals—Refrigeration Installations—Power Plants—etc. Several sizes and scale lengths, temperature ranges, switch combinations, portable and mounted types fill out the Alnor line for complete satisfaction. Write for special detailed Bulletin.

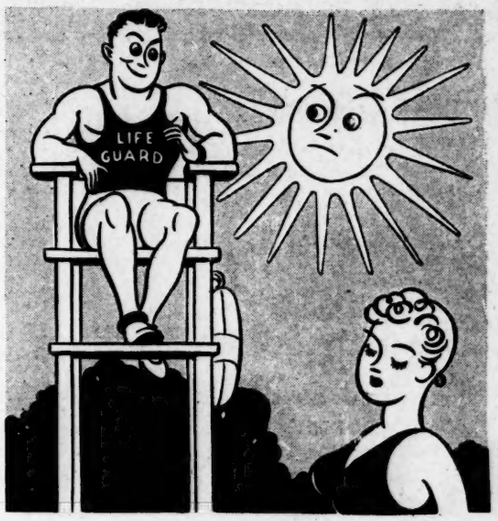
ALNOR VELOMETER

INSTANTANEOUS
DIRECT READING
ALL PURPOSE
AIR VELOCITY METER

Another Alnor product, indispensable to the engineer and technician, is this all purpose Velometer—responsive, accurate, ruggedly designed means for easily and speedily measuring air velocities in all types of grilles and ducts. A change of jets provides similar measurement of pressures at the same points. Particularly advantageous for ordinarily inaccessible locations. Fully described in individual Bulletin. Write for your copy.

See these Instruments at the INTERNATIONAL HEATING AND VENTILATING EXPOSITION Booth 651

ILLINOIS TESTING LABORATORIES, INC.
143 W. Hubbard St., Chicago, Ill.



STRENGTH AT HIGH TEMPERATURES

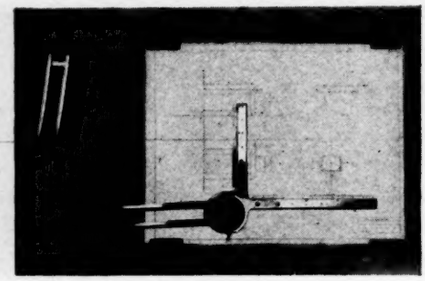
Air conditioning and heating plant controls are frequently subject to high temperatures. In order to give the service for which such controls are intended, they must be able to withstand high temperatures; there must be no hesitancy in action under adverse conditions, no variation in movement, otherwise the whole system may be upset. Fuel is then wasted, the heating plant suffers, and the owner becomes dissatisfied.

Air conditioning and heating engineers, for the protection of their own reputation, should make certain that there is nothing about the control element of the system about to be installed that, in time, or at high temperatures, may slip or leak and thereby cause a shifting in mechanical movement as originally set. Your reputation and the future success of your business depend on the reliability of the systems you install.

Chace High-Temperature Thermostatic Bimetals are engineered to operate mechanical controls; these bimetals are made to operate under the most severe conditions; there is nothing about them to leak or weaken. Chace High-Temperature Bimetal in a control is your assurance of uniform, dependable, care-free, automatic action, because Chace Bimetal has that *extra strength* so essential to satisfactory control results when operating at *high temperatures.*

Control manufacturers are invited to consult us regarding the type of Chace Thermostatic Bimetal best suited to meet specific demand.

W. M. CHACE CO.
1606 Beard Ave., DETROIT, MICHIGAN

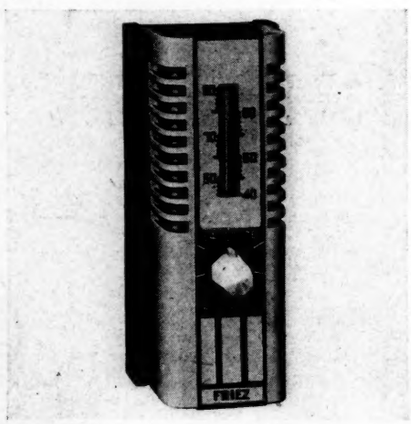


Wrigraph Drafting Machine

NAME AND MODEL NUMBER—Wrigraph drafter, Model D 520.
PURPOSE—For drafting.
FEATURES—This instrument will make drawings 20 x 26 in. or smaller. It is finished with a special tack-on mounted plate so that it can be fastened to any flat wooden surface and in any position. The protractor is of the 1 degree indicating type and a new kind of transparent edge, engine divided scale is used. Scales are interchangeable on the protractor head and all standard graduations are available. Instrument is equipped with adjustable ball bearings which are said to considerably increase the life of the machine. The entire machine can be knocked down and carried in a brief case. Price, including one set of scales, $19.00.
MADE BY—*L. G. Wright, Inc., 5209 Euclid Ave., Cleveland, Ohio.*

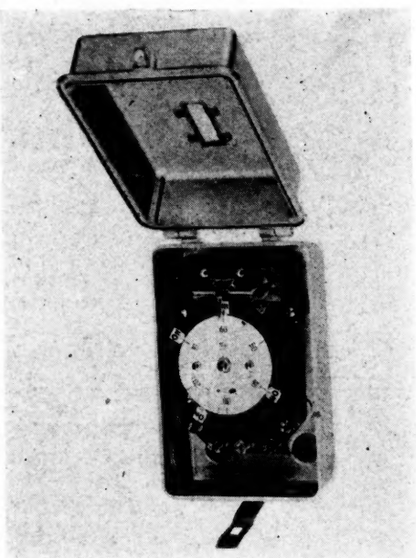
Friez Thermostat

NAME—Friez Microstat.
PURPOSE—A low priced thermostat.
FEATURES—Thermostat operates on 25 volt, 2 amperes maximum. Case covers a switch mechanism suspended from a single point and featuring 'Alnico' magnets, heat-treated bi-metals, and gold contacts. Manufacturer states that the well ventilated case with a built-in thermometer insures greater sensitivity and that an exceptionally close differential control is provided by a simple adjustment. Case size 3½x1½x1½ inches.
MADE BY—*Julien P. Friez & Sons, Baltimore, Md.*



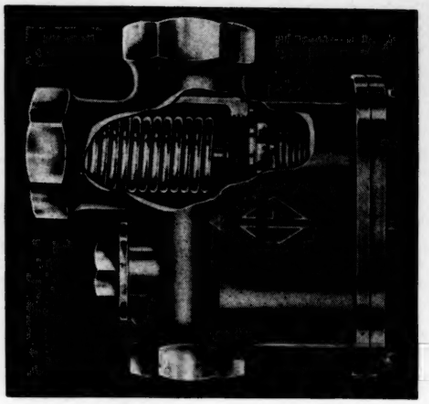
Cramer Cycle Timer

NAME—Type C.T. cycle timer.
PURPOSE—For automatic timing the operation of stokers, thermostats and like equipment.
FEATURES—This timer has been designed for use on alternating current circuits to either close or open a single circuit at any pre-set operating interval or to alternately close or open two circuits at any pre-set operating interval, one circuit operating instantaneously with the closing of the other and vice versa. Among the features claimed are (1) a variety of time ranges—there being 8 different time scales ranging from one revolution in 60 seconds to one revolution in 24 hours. (2) the number of operations—each dial being equipped with 4 operating arms so that either one or two cycles can be obtained in one revolution of the dial. (3) ready adjustment. (4) the timing motor which will start on a plus or minus 20% of the rated voltage. (5) a switch mechanism has a definite snap action.
MADE BY—*The R. W. Cramer Company, Inc., Centerbrook, Conn.*



Carson Airgraph

NAME—Carson Airgraph.
PURPOSE—A device for indicating the temperature and relative humidity of room air.
FEATURES—This instrument consists of a thermometer and a hygrometer working on revolving drums, which is said to make it possible to read the temperature and the relative humidity of the room directly without the calculations or the use of charts. The instruments are mounted in a hand rubbed, solid walnut and maple case. Price, $3.50.
MADE BY—*Carson Manufacturing Co., 1611 N. Wolcott Ave., Chicago, Ill.*

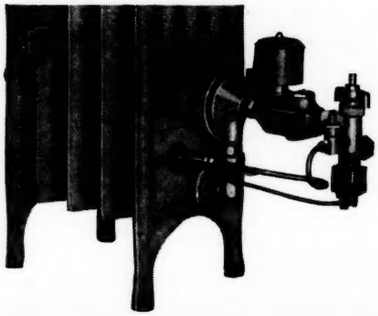


Gerstein & Cooper Tempering Valve

NAME—G & C tempering valve.
PURPOSE—For the automatic regulation of water temperature.
FEATURES — Valve is made entirely of bronze and the actuating bellows and all operating parts are out of the water. Valve can be used wherever the water supply is above 150F and is factory set to deliver water at 140F. There is a range of adjustment which makes possible water deliveries from 100 to 200F outlet water temperatures when the domestic hot water is heated sufficiently. Valves are furnished in 1 in. size only but can be bushed to take ½ or ¾ in. pipe.
MADE BY—*Gerstein & Cooper, South Boston, Mass.*

Automatic Gas Safety Pilot

NAME—Automatic control and safety pilot.
PURPOSE—For preventing a flow of gas to the burner in the absence of a pilot flame.
FEATURES—It is announced that this new automatic control and safety pilot is designed for use on the company's line of gas-steam radiators. The device uses a constant burning pilot and a positive safety pilot. In operation the valve is manually actuated with the reset button and the pilot flame is lighted. Within a few seconds the valve remains open. In the event of failure of the pilot flame the valve closes.
MADE BY—*Automatic Gas Steam Radiator Co., Pittsburgh, Pa.*



MONDAY, JANUARY 15

8:00 A.M. to 10:00 A.M.: RSES Registration, Stevens Hotel

10:00 A.M.: RSES Meeting, Stevens Hotel
- Invocation
- Chicago Welcomes You
- Greetings from Manufacturers Association by J. S. Forbes
- Introduction of National Officers
- Address by President C. A. Brunton
- Secretary's, Treasurer's and Committee Reports
- Appointment of Committees

2:00 P.M.: NRSJA Meeting, Stevens Hotel
- President's Address by Leo H. Gorton
- Economic Importance of the Refrigeration Wholesaler—W. C. Allen
- How the Parts Manufacturer Can Help the Jobber by C. W. Dennis

2:30 P.M.: RSES Secretaries' Meeting, Stevens Hotel

6:30 P.M.: NACA Dinner Meeting of the Temporary Council—Stevens

TUESDAY, JANUARY 16

9:00 A.M.: NRSJA Meeting, Stevens
- Maintaining Satisfactory Profits by C. B. Westbrook
- Fundamentals of Successful Merchandising by Edwin B. Moran
- Possibilities of Regional Groups by R. W. Sheperdson
- Report of Manufacturers' Relations Committee by Frank Langsenkamp

9:45 A.M.: RSES Information Please, Stevens Hotel

10:00 A.M.: RSES Meeting, Stevens
- Proper Oil Charge for Commercial Systems by Paul B. Reed
- Dehydration of Refrigerating Equipment and Systems, practical demonstration by A. M. Fenwick
- Movie
- Preservation of Meat Products—Temperatures, Humidities, Air Velocities, Designs, Control Methods, etc., by H. B. Howe
- Report of Nominating Committee
- Election of Officers

10:00 A.M.: NACA Meeting, Stevens
- Meeting of Charter Members
- Report of Progress by John H. Keller, National Chairman
- Reports of Chairmen of Local Councils
- Roll Call of Charter Members
- Presentation of Proposed Constitution and By-laws
- Appointment of Nominating Committee, Resolutions Committee.

Noon: Joint Luncheon—NRSJA and REMA, Stevens Hotel

2:00 P.M.: NACA Open Meeting, Stevens Hotel
- Report of Temporary Advisory Publicity Committee
- Presentation of Proposed Cooperative Program of Trade and Public Education and Market Development by Paul B. Zimmerman

6:30 P.M.: All Industry Banquet, Stevens Hotel

WEDNESDAY, JANUARY 17

9:00 A.M.: ASRE Registration, Blackstone Hotel

9:00 A.M.: NRSJA Business Meeting, Stevens Hotel
- Committee Reports
- Election of Directors and Officers

9:45 A.M.: RSES Information Please, Stevens Hotel

10:00 A.M.: RSES Meeting, Stevens
- History and Development of the Soda Fountain by A. F. McMahon
- Movie
- Engineered Air Distribution illustrated by V. M. Lathers
- Reports of Convention Committees

10:00 A.M.: ASRE First Meeting, Blackstone Hotel
- Topic: Industrial Refrigeration
- Motors for Commercial Refrigerating Equipment by C. C. Leader
- Application of Heat Transfer Data to Design of Horizontal Shell-and-Tube Condensers by Henry B. Pownall
- Refrigeration in the Petroleum Industry by G. A. Beiter

10:00 A.M.: NACA General Meeting, Stevens Hotel
- Report of Committees
- Election of Officers and Directors

Noon: NRSJA Farewell luncheon, Stevens Hotel
- Installation of Officers

12:45 P.M.: ASRE Welcome Luncheon, Blackstone Hotel
- Speaker: Dr. Henry T. Heald, President, Armour Institute

1:00 P.M.: NACA Luncheon Meeting of Officers and National Council, Stevens Hotel

2:00 P.M.: NACA General Meeting, Stevens Hotel
- Discussion of 1940 Program

2:30 P.M.: Joint Meeting ASRE and RSES, Stevens Hotel
- Topic: Small Refrigerating Systems
- Bomb Method of Charging Refrigerator Units by G. S. McCloy and A. W. Haley
- Pressure Drop in Liquid Lines by Ernest Gygax and K. S. Willson
- Tube Bending Contest

8:30 P.M.: RSES Farewell Party, Stevens Hotel

THURSDAY, JANUARY 18

10:00 A.M.: ASRE Conference on Corrosion, Blackstone Hotel
- ASRE Conference on Agricultural Research, Blackstone Hotel

2:30 P.M.: ASRE Third Meeting, Blackstone Hotel
- 35th Anniversary Ceremony
- Induction of J. F. Nickerson as Honorary Member
- Refrigeration in 1904 by David L. Fiske, Secretary, ASRE
- Refrigeration in 1954 by S. C. Bloom, Consulting Engineer, Chicago, Ill.
- Reports of Committees

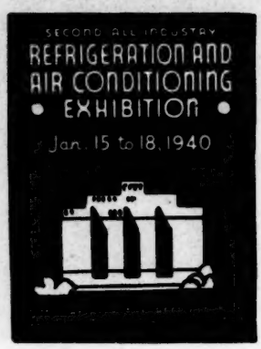
7:30 P.M.: ASRE Dinner-Dance, Blackstone Hotel

FRIDAY, JANUARY 19

10:00 A.M.: ASRE Fourth Meeting, Blackstone Hotel
- Topic: Refrigeration of Foods
- Refrigeration of Lard, Oil and Fats by H. S. Mitchell
- Ultra-Violet Light in Beef Chilling by P. B. Christensen
- Air Conditioning Applied to Foods by H. B. Matzen
- Inspection Tour, Armour & Co.

12:30 P.M.: ASRE Council Luncheon, Blackstone Hotel.

STEVENS HOTEL



CHICAGO, ILL.

A

Acme Industries, Inc. 41
Aerovox Corporation 2
Alco Valve Company, Inc. 113-114
Aluminum Company of America.....67-68
Aluminum Industries, Inc. 152
All-Steel Equip. Company 70
The American Brass Company 143
American Hard Rubber Company.....38
American Injector Company 133
American Radiator & Standard Sanitary Corp. 29
Anemostat Corp. of America.....69
Ansul Chemical Company.....77-78
Arcade Manufacturing Company 1B
Automatic Products Company.....82-83

B

Black Sivalls & Bryson, Inc. 102
Bohn Aluminum Co.....105
Bonney Forge & Tool Works.....90
Brunner Manufacturing Company...145-146
Bush Manufacturing Company 75-76
Business News Publishing Co. 110-111

C

Carrier Corporation 35-36
Chase Brass and Copper Co. 56
Chicago Metal Hose Corp. 13
B. H. Clark Company.....30
Chicago-Wilcox Mfg. Co. 91
Commercial Coil & Refrigeration Co. 142
Convention Binder Service 1C
Copeland Refrigeration Corp. 86-87
Cornell Dublilier Company 55
Cutler-Hammer, Inc. 71-72
Curtis Refrigerating Machine Co. 8-9

D

Day & Night Water Heater Co., Ltd. 22
Dayton Rubber Mfg. Company 144
Deissler Machine Company 136
Detroit Lubricator Company 88-89
Dole Refrigerating Company 84-85

E

E. I. duPont de Nemours Co. 24
Durabilt Steel Locker Co. 130
Duro Metal Products Company.....99

E

Electrimatic Corporation 116
Evers Hardware Company 45

F

Fedders Manufacturing Co. 15-16

G

Gale Products 115
General Controls Company 17
The Gates Rubber Company 48
General Electric Company 93-94
General Electric Company 51-52
L. H. Gilmer Company 109

H

W. A. Hammond Drierite Company 3
Henry Valve Company 103-104
HEATING & VENTILATING 65
Howe Ice Machine Company.....112

I

Iceberg Refrigerated Locker System....65A
Ideal Beer Cooler Co. 57
Imperial Brass Company.....139-140-141
Industrial Press 65
Insto Gas Corp. 44
The Insulite Co. 43

J

Jarrow Products Corp. 1A
Jewett Refrigerator Co., Inc. 53

K

Kason Hardware Company 37
Kelvinator Division 58-59
Kerotest Manufacturing Co. 97-98
Kold-Hold Manufacturing Co. 10-11

L

LaCrosse Novelty Box Mfg. Co. 27

M

Marlo Coil Company 154-155
Jas. P. Marsh Corp. 119
Master Refrigerated Locker Systems, Inc..47
McCord Radiator and Mfg. Co. 49-50
McIntire Connector Company 129
The Mercoid Corporation 66
Midwest Manufacturing Co. 20-21
Mills Novelty Company 137-138
Minneapolis-Honeywell Regulator Co. 61
Modern Equipment Corporation 4-5-6
Mueller Brass Company 117-118
Muncie Gear Works 28
E. B. Muzzarelli & Co. 46

N

Nickerson & Collins Company .....A

P

The Pacific Lumber Company 7
Peerless of America, Inc. 123-124-125
Penn Electric Switch Company 95-96
Perfection Refrigeration Parts Co. 81
Perlick Brass Company 18-19
H. A. Phillips and Company 34
Portable Elevator Mfg. Co. 92

R

Ranco, Inc. 106-107
Refrigerating Engineering 74
Refrigeration Appliances, Inc. 25-26
Rempe Company 60
Rotary Seal Company 153

S

Sanders Butcher Supply Co. 23
Servel Inc. 39-40
The Charles Q. Sherman Corp. 42
Simmons Merchandising Service 33
South Bend Lathe Works 151
Spoehrer-Lange Company 73
Sprague Products 31
Square D Company 147-148
Superior Valve & Fittings Co. 126

T

Tecumseh Products Corp. 127-128
Temprite Products Corporation 100
The Texas Company 121
Thermek Corp. 12
Tyler Fixture Corporation 62

U

Universal Cooler Corporation 131-132
United Friguator Engineers 32
Utilities Engineering Institute 79

V

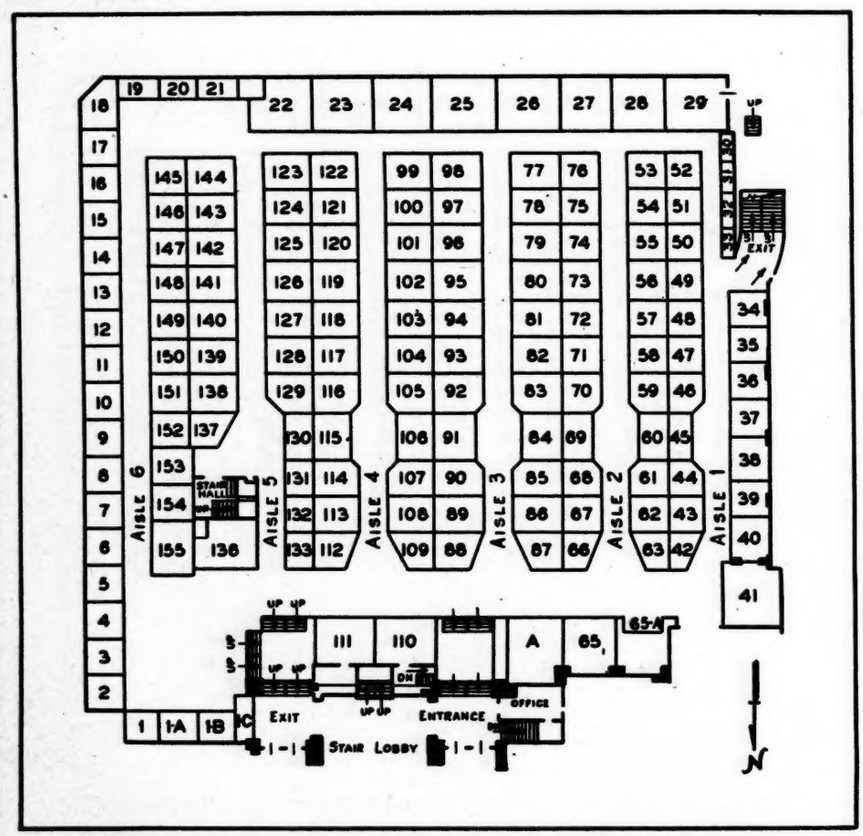
Victor Manufacturing & Gasket Co. 120
Virginia Smelting Co. 108
J. H. H. Voss Inc. 54

W

Wagner Electric Corp. 14
The Weatherhead Company 149-150
White-Rodgers Electric Co. 63
Williams Oil-O-Matic Corp. 122
Wolverine Tube Company 80

Z

Zenith Carburetor Division 101



Floor plan, Exhibition Hall, Stevens Hotel, Chicago, Ill.

MONDAY, JANUARY 22

8:30 A.M.: ASHVE Registration at the Hotel Statler
9:30 A.M.: ASHVE Conference of Chapter Delegates, Hotel Statler
10:30 A.M.: ASHVE Committee Meetings, Hotel Statler
2:00 P.M.: Opening of 6th International Exposition—Lakeside Hall
2:30 P.M.: ASHVE Nominating Committee Meeting, Hotel Statler
5:00 P.M.: ASHVE Social Hour at the Hotel Statler
10:00 P.M.: ASHVE Get-together Party, Informal Dance, Hotel Statler

TUESDAY, JANUARY 23

8:30 A.M.: ASHVE Registration at the Hotel Statler
9:30 A.M.: ASHVE Technical Session —Hotel Statler
Technical Papers—
Effect of Lint on Air Filter Performance by Frank B. Rowley and Richard C. Jordan
Costs of Gas and Electric Powered Air Conditioning Plants, by G. E. May
On The Dynamical and Thermal Behavior of Water Drops in Evaporative Cooling Processes, by H. B. Nottage and L. M. K. Boelter
Report of Tellers of Election
9:30 A.M.: NWAH-ACA Meeting at the Hollenden Hotel
President's Message—L. R. Taylor
Address—Charles M. White
Don't Overlook the Gravity Furnace —C. Ackerson
The Three Bogeymen—C. T. Burg
Publicity Campaign—A. P. Ames
2:00 P.M.: ASHVE Technical Session —Hotel Statler
Solar Radiation and Heat Transfer Through Glass Block Construction, by F. C. Houghten, David Shore and Harold T. Olson
Thermal Test Coefficients of Aluminum Insulation for Buildings, by G. B. Wilkes, F. G. Hechler and E. R. Queer
Effect of Diminishing Return on the Value of Insulating Materials, by Paul D. Close
Calculation of Coil Surface Areas for Air Cooling and Dehumidification, by J. W. McElgia and D. C. Wiley
2:00 P.M.: NWAHACA Research Session, Hollenden Hotel
Research is a Stimulation to Management, Operation and Sales, Chairman, C. A. Olsen
Report of Research Advisory Committee—F. G. Sedgwick
Our New Volume Winter Air Conditioning—Forced Warm Air Heating
Heat Insulation—A. P. Kratz
Resistance of Air Flow to Registers and Grilles by S. Konzo
5:00 P.M.: ASHVE Social Hour—Hotel Statler
10:00 P.M.: ASHVE and NWAHACA Stag Smoker—Hollenden Hotel

WEDNESDAY, JANUARY 24

9:30 A.M.: ASHVE Technical Session —Hotel Statler
Report of Committee on Research, W. L. Fleisher, Chairman
The Peripheral Type of Circulatory Failure in Experimental Heat Exhaustion—The Role of Posture, by R. W. Keeton, F. K. Hick, Nathaniel Glickman and M. M. Montgomery
Advantages of Bactericidal Ultra-Violet Radiation in Air Conditioning Systems, by R. C. Rentschler and Rudolph Nagy
Seasonal Variation in Reactions to Hot Atmospheres by F. C. Houghten and A. A. Rosenberg
9:30 A.M.: NWAHACA Meeting—Hollenden Hotel
Our Installation Codes—B. F. McLouth, Chairman, Installation Codes Committee
Sizing Registers for Forced Air and Air Conditioning Installations—J. H. Van Alsburg
Advertising and Merchandising Clinic—F. E. Mehrings, Chairman, Merchandising Committee

Our Over-All Merchandising Interest—Jan S. Irvine
9th Annual Short Course—Year Around Furnace Air Conditioning —L. G. Miller
Election of Officers
2:00 P.M.: ASHVE and NWAHACA Technical Session—Joint Meeting, Hotel Hollenden
The Research Activity of ASHVE—W. L. Fleisher
The Research Activity of NWAHACA —Frank L. Meyer
The Bank of the Future, Charles M. Mylander
Performance of Stoker-Fired Warm Air Furnace as Affected by Burning Rate and Feed Rate—A. P. Kratz and S. Konzo
7:00 P.M.: ASHVE and NWAHACA, Annual Banquet and Dance—Hotel Statler

THURSDAY, JANUARY 25

9:00 A.M.: NWAHACA Inspection Trip—Strip Mill, Republic Steel Corp.
10:00 A.M.: ASHVE Technical Session —Hotel Statler
Factors Affecting Duct Friction by J. B. Schmieler, F. C. Houghten and Harold T. Olson
The Performance of Stack Heads, by D. W. Nelson
Installation of Officers
12:00 Noon: Rotary Club Luncheon—Hotel Statler
The Air Cooled Human Body by Dr. C.-E. A. Winslow
1:00 P.M.: Inspection Trip to Industrial Rayon Corp., Painseville
1:30 P.M.: ASHVE Inspection Trips
1:30 P.M.: SMR & ACCNA—Hotel Carter
Opening of the Convention
An Outline of the Need for a National Association by Editors of Various Trade Journals
An address by Frank E. Ederle, temporary president
Review of the Founding of the National Secretaries Conference, by Carl Gundlach
Report on the Proceedings of the National Secretaries Conference, by Paul Biersach, secretary
Code of Regulations and By-laws by Henry C. Vitter, chairman
Election of Directors

A

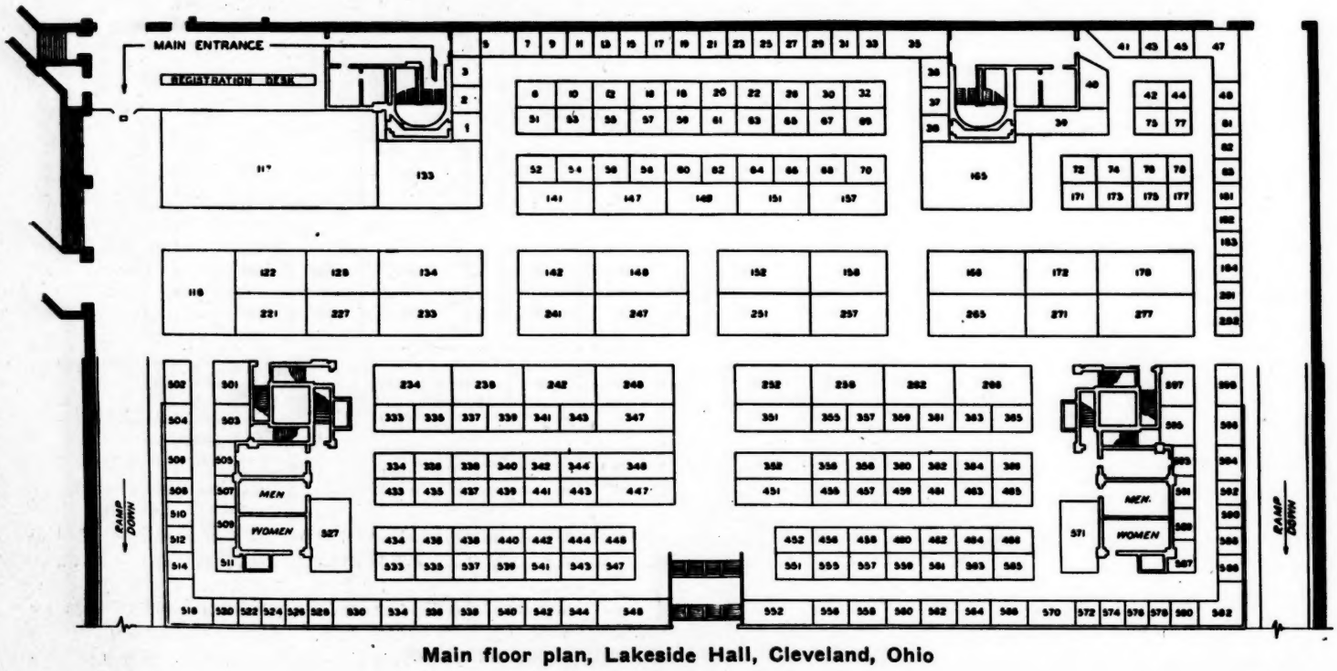
Aerofin Corporation 227, 233
Air Conditioning & Oil Heat 548
Air Controls, Inc., Division of The Cleveland Heater Co. 341, 343
Air Control Products, Inc. 598
Aireozone Corporation, The 82
Air-Maze Corporation 535
Airtemp Division, Chrysler Corporation .41-45, 47, 48, 75, 77
Aldrich Company 922, 924
Allis-Chalmers Mfg. Company..642, 644, 646
Aluminum Aircell Insulation Co. 742
American Air Filter Co., Inc. 464, 466
American Artisan 141
American Brass Company, The 277
American Gas Association 165
includes—
American Gas Products Co.
Baker Company, Ira E.
Bastian-Morley Co., Inc.
Bryant Heater Company
Burnham Boiler Company
Cleveland Heater Company
Detroit Lubricator Co.
Forest City Foundries Co.
Gas Equipment Company
General Controls Company
Hotstream Heater Company
Lennox Furnace Company
Mueller Furnace Co., L. J.
Reznor Manufacturing Co.
Servel, Incorporated
Surface Combustion Corporation
Waterman-Waterbury Company
Westinghouse Electric & Mfg. Co.
White-Rodgers Electric Co.
American Machine & Metals Inc., DeBothezat Ventilating Equipment Div..53
American Metal Hose Branch, The American Brass Company 277
American Radiator & Standard Sanitary Corp. 117
American Rolling Mill Co., The 271
American Society of Heating and Ventilating Engineers 503
American Steel & Wire Company 438, 440, 537, 539
American Stove Co., Lorain Div. 836
American Viscostat Co. 641
Ames Vacuum Heating Pumps 635
Anchor Post Fence Co., Fluid Heat Division 929, 933
Anderson Products, Incorporated 541
Anderson Company, The V. D. 56
Anemostat Corp. of America 527
Armstrong Machine Works 7
Armstrong Steam Trap Co. 7
Atlantic Valve & Pump Co. 17
Atlas Ball Co. 730
Auer Register Company, The 647
Auto-Heat Corporation 333, 335
Automatic Burner Corporation, Kleen-Heet, Inc. 560, 562
Automatic Gas-Steam Radiator Co. 514
Automatic Heat and Air Conditioning .59, 61
Automatic Products Company 437, 439
Autovent Fan & Blower Co. 448

B

Baker Ice Machine Company, Inc. 74
Baldor Electric Company 442
Barber-Colman Company 171, 173
Barber Gas Burner Company, The 654
Barnes & Jones, Inc. 334
Beaver Pipe Tools, Inc. 352
Beckett Engineering Co., R. W. 725
Bell & Gossett Company 64, 66
Bethlehem Foundry & Machine Co. 951
Bethlehem Steel Company 434, 436
Bishop & Babcock Mfg. Company, The..744
Black & Decker Mfg. Co., The 640
Boston Draft Control Co. 63-65
Breuer Electric Mfg. Co. 509
Brown Instrument Company..552, 556, 558
Bryant Heater Company 147, 149, 151
Buffalo Forge Company 241
Burdett Manufacturing Company 621
Burnham Boiler Corp. 122

C

Canton Stoker Corporation 630
Carbondale Division, Worthington Pump & Machinery Corp. 543, 547
Carey Company, The Philip 657
Carnegie-Illinois Steel Corporation 438, 440, 537, 539
Carrier Corporation 227, 233
Carter Coal Company 947
Celotex Corporation, The 534
Central Die Casting & Mfg. Co., Inc.....755
Century Electric Company 748
Century Engineering Corp. 148
Chace Company, W. M. 637
Char-Gale Mfg. Co. 738
Chase Brass & Copper Co. 659
Chicago Filter Company 15
Chicago Pump Company 265
Chrysler Corporation, Airtemp Division ...41-45, 47, 48, 75, 77
Cleveland Steel Products Corp..839, 841, 843
Cole-Sullivan Engineering Company 281



Main floor plan, Lakeside Hall, Cleveland, Ohio

Columbia Steel Company..438, 440, 537, 539
Comfort Products Corporation 83
Commercial Filters Corporation 528
Commercial Investment Trust Incorporated 984, 986
Conco Corporation 938, 940
Cooh Electric Company 939
Crane Co. 252, 258
Crowe Name Plate & Mfg. Co. 512
Curtis Refrigerating Machine Co. 747
Cyclone Fence Company..438, 440, 537, 539

D

Dayton Rubber Manufacturing Co...564, 566
DeBothezat Ventilating Equipment Div., American Machine & Metals Inc. 53
Detroit Lubricator Company 570
Dole Valve Company, The 633
Domestic Engineering 59, 61
Domestic Engineering Catalog Directory 59, 61
Dongan Electric Manufacturing Co. 837
Dowagiac Steel Furnace Company..356, 358
Doyle Vacuum Cleaner Company 21
Dunham Company, C. A. 251
Duo-Therm Division, Motor Wheel Corp. 463, 465

E

Eagle-Picher Sales Co., The 1-2
East Ohio Gas Company, The 165
Electrol, Inc. 944, 946, 948
Emerson Electric Mfg. Co., The 533
Evans Products Company 733, 735
Excelsior Steel Furnace Co., The 914

F

Fafnir Bearing Company, The 753
Fairbanks, Morse & Co. 559, 561
Field Manufacturing Co. 63, 65
Fitzgibbons Boiler Company 142
Fluid Heat Division, Anchor Post Fence Co. 929, 933
Forest City Foundries Co., The 23, 25
Fox Furnace Company 117
Freeman Stoker Division, Illinois Iron & Bolt Co. 10
Frick Company 751
Friez & Sons, Julien P., Division Bendix Aviation Corp. ..536, 538
Fulton Sylphon Co., The 363, 365
Furblo Company 638

G

General Controls Company 5
General Electric Co. 157
General Electric Co., Air Conditioning Department ...158, 257
General Furnaces Corporation 942
General Refrigeration Corp. 636
General Regulator Corporation 27
Gilbert & Barker Mfg. Co. 68, 70
Globe Machine & Stamping Co., The 181
Grinnell Company, Inc. 242

H

Harris & Company, Arthur 639
Hart & Cooley Mfg. Co. 530
Heat Reclaiming Devices, Inc. 928
Heating, Piping & Air Conditioning 141
HEATING & VENTILATING 910, 912
Heil Company, The 455, 457, 459
Henry Furnace & Foundry Co., The.656, 658
Hilo Varnish Corporation 72
Hoffman Specialty Company Inc. 128
Hotstream Heater Company 441, 443

I

Ilg Electric Ventilating Co. 338, 340
Illinois Engineering Company 221
Illinois Iron & Bolt Co., Freeman Stoker Division 10
Illinois Testing Laboratories, Inc. 651
Imperial Brass Mfg. Company 76
Independent Register Co., The 451
Independent Pneumatic Tool Co. 838
Industrial Press, The 910, 912
Ingersoll Steel & Disc Div., Borg-Warner Corp. 757
Insto-Gas Corp. 858
Iron Fireman Mfg. Company 952, 954, 956, 958

J

Janette Manufacturing Co. 625
Jefferson Electric Company 745
Jenkins Bros. 118
Johns-Manville 342, 344
Johnson Service Company 571
Johnson Co., S. T. 950

K

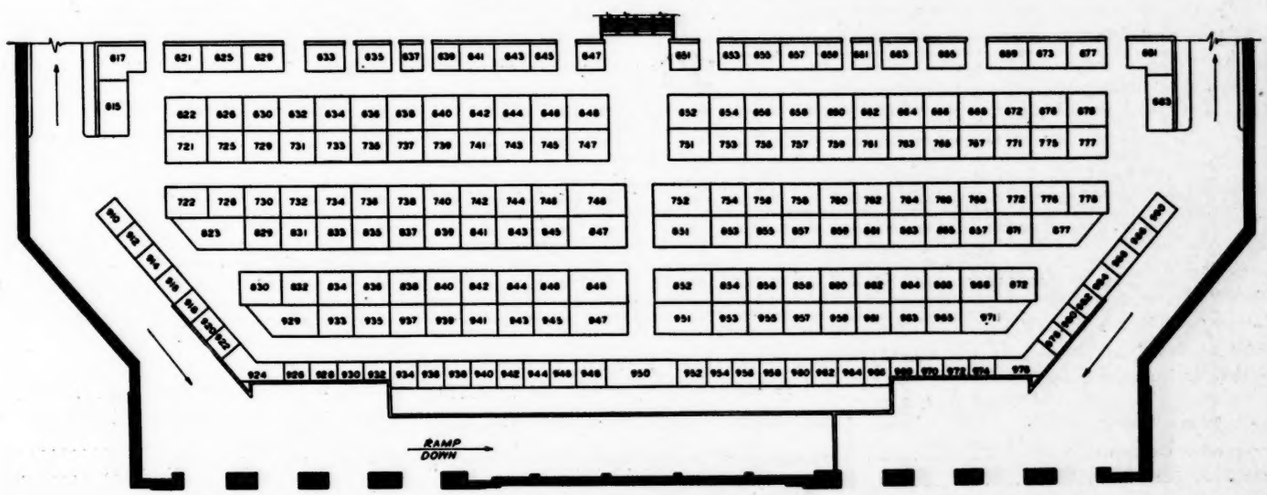
Kaustine Company Inc. 12, 16
Kehm Corporation, The 721
Kent Company, Inc., The 9
Kewanee Boiler Corp. 117
Kleen-Heet, Inc. 560, 562
Koppers Coal Company, The 960, 962

L

Lamneck Products, Inc. 551, 555, 557
Lau Blower Co., The 847

Mc

McAlear Mfg. Co., The 635
McCord Radiator & Mfg. Co. 739
McDonnell & Miller 182, 183



Lower floor plan, Lakeside Hall, Cleveland, Ohio

M

Macrae Incorporated 643
Magnet Switch Company 526
Maid-O'-Mist, Inc. 524
Marsh Corp., Jas. P. 69
Maurey Manufacturing Corp. 572
May Oil Burner Corp. 30, 32
Mercoid Corporation, The 563, 565
Meriam Company, The 661
Metal Stamping & Mfg. Co., The 737
Meyer & Bro. Co., F. 36
Meyer Furnace Co., The 37, 38
Minneapolis-Honeywell Regulator Co. 552, 556, 558
Modine Mfg. Company 752
Monarch Manufacturing Works Inc. 282
Monmouth Products Company 3
Motor Wheel Corp., Duo-Therm Division 463, 465
Mueller Brass Company 364, 366
Mueller Furnace Co., L. J. 134
Murray Corporation of America, The 918, 920

N

Nash Engineering Co. 248, 347
National Machine Works 67
National Tube Company..438, 440, 537, 539
Nesbitt, Inc., John J. 501
Niagara Blower Company 175, 177
Norge Heating & Conditioning Division, Borg-Warner Corporation 433

O

Ohio Foundry and Manufacturing Co., The 953
Oilheating & Airconditioning Fueloil Journal 853, 855
Olson Inc., Barney 67
Oster Manufacturing Co., The 634
Owens-Corning Fiberglas Corp. 846, 848

P

Pacific Gas Radiator Company 758, 760
Pacific Lumber Company, The 81
Patterson-Kelley Co., Inc. 462
Peerless Electric Co., The 461
Peerless Manufacturing Corp. 662
Penn Boiler & Burner Mfg. Corp..968, 970
Penn Electric Switch Co. 55, 57
Perfection Stove Company 133
Perfex Corporation 52, 54
Petroleum Heat & Power Co. 518, 520
Petrometer Corporation 63, 65
Pittsburgh Lectrodryer Corporation 511
Plumbing & Heating Journal 586
Plumbing & Heating News 59, 61
Pocahontas Fuel Company Inc. 930, 932, 934, 936
Power Plant Supply Company 635
Progressive Company, The 982
Propellair, Inc. 845
Pyrolite Products Co., The 19

Q

Quaker Manufacturing Company 22, 26
Quiet-Heet Manufacturing Co. 935

R

Randall Graphite Products Corp. 447
Reif-Rexoil, Inc. 359, 361
Republic Steel Corporation 166
Research Laboratory, American Society of Heating and Ventilating Engineers, The ...506, 508
Reynolds Mfg. Co. 754
Richmond Radiator Company 544
Ric-wil Company, The 629
Ridge Tool Company, The 31, 33
Rome-Turney Radiator Company, The...632
Roots-Connersville Blower Corp. 635
Ruberoid Company, The 615
Russell Insulation Co., The F. C. 336

S

SKF Industries, Inc. 730
Sarco Company, Inc. 238
Schaub Engineering Co., Fred H. ..972, 974
Scully Steel Products Company 438, 440, 537, 539
Servel, Inc., E. R. & A. C. Division 622
Sheet Metal Worker 502
Skilsaw, Inc. 740
Snips Magazine 184
Spang Chalfant, Inc. 756
Spence Engineering Company, Inc. 626
Spencer Thermostat Company 435
Standard Lime & Stone Co., The 510
Stanley Electric Tool Div., The Stanley Works 677
Steel & Tubes, Inc. 337, 339
Stoker & Airconditioner Journal 857
Streamline Pipe and Fittings Division, Mueller Brass Co. 364, 366
Strong, Carlisle & Hammond Co., The...663
Sullivan Valve & Engineering Co. 504
Sundstrand Machine Tool Co. 645
Surface Combustion Corporation 247

T

Taco Heaters, Inc. 355, 357
Taylor Winfield Corporation, The 746
Tennessee Coal, Iron & Railroad Co. 438, 440, 537, 539
Thrush & Co., H. A. 8
Timken Silent Automatic Division, The Timken-Detroit Axle Co. 852, 854, 856
Tinnerman Products, Incorporated..734, 736
Toledo Pipe Threading Machine Co., The 11, 13
Trane Company, The 39, 40
Triplex Heating Specialty Co., Inc. 522
Tuthill Pump Company 648
Tuttle & Bailey Incorporated 653, 655

U

United States Radiator Corporation 234
United States Register Company 444
United States Steel Corp..438, 440, 537, 539

V

Viking Manufacturing Corp. 834
Viking Air Conditioning Corp. 652
Vinco Co., Inc., The 660
Viscostat Company, The 641

W

Wagner Electric Corporation 360, 362
Walton Laboratories, Inc. 35
Ward Company, Inc., Edgar T. 617
Waterloo Register Company, The ..505, 507
Waterman-Waterbury Co., The 172
Watts Regulator Company 51
Wayne Oil Burner Corporation 945
Weatherhead Company, The 741, 743
Webster Electric Company 851
Webster & Company, Warren 152
Weil-McLain Company 348
Weinman Pump Mfg. Co., The 635
Westinghouse Electric & Mfg Co. 452, 456, 458, 460
White-Rodgers Electric Co. 540, 542
Whitney Metal Tool Company 683
Whittington Pump & Engineering Co...681
Will-Burt Company 978, 980
Williams Oil-O-Matic Heating Corp.....178
Wilson Co., The H. A. 937
Wing Mfg. Co., L. J. 78
Wood Industries Inc., Gar 58, 60, 62
Worthington Pump & Machinery Corp., Carbondale Division 543, 547

X

"X" Laboratories, Inc. 29

Y

York Ice Machinery Corp. 262, 266
York Oil Burner Co., Inc. 840, 842, 844
Young Radiator Company 351
Young Regulator Company 926
Youngstown Sheet & Tube Company, The 18, 20

A SECTION OF THE
INDUSTRIAL PLANT
BY

Plymouth

engineers write an industrial epic in developing a remarkable ventilation system for providing dust-free air for a production process and for greatly improving working conditions in the largest automotive sheet metal spray booth installation in the world.

By CLIFFORD STROCK

THE problems connected with paint spraying are usually headaches. Paint spraying in plants with high continuous production can and often does result in a continuous headache. And when the largest automotive sheet metal paint spraying installation in the world is adapted to new paint materials, larger parts, and more rigid exhaust codes, and when, during the same period that these changes are being made, an improved process of paint reclamation is adopted, the engineers responsible for the design and operation of the necessary equipment find their hands full and their minds working overtime. Such was the position in which Chrysler Corporation's Plymouth plant engineers, headed by C. C. Williams, found themselves during recent years.

Such a period of change was culminated when the 1940 Plymouth began to roll off the assembly line early in the fall of 1939. In the meantime, among the conditions which were improved and the difficulties overcome were those of ventilation, possibly dust, general working conditions, air conditions in the neighborhood of the factories and paint reclamation. It is with these phases that the present article is concerned.

Six years ago Plymouth cars were painted with lacquer. Lacquer dried with a fine smooth finish. Any part whose finish became damaged or marred during the factory processes needed only local retouching. Most important, lacquer dried quickly. On the other hand it had some disadvantages, one of them being that to obtain a really fine finish it had to be hand rubbed. Also lacquer would tend to oxidize in sunlight, causing "traffic film."

About that time so-called synthetic enamel was introduced, the base of which is the soy bean. This kind of enamel is not oxidized by the sun, will keep its luster for years, and is less expensive to apply. Therefore the Plymouth engineers decided to try it out.

As was to be expected in the beginning, there were some serious problems to be overcome. It was found that the slightest amount of dust in the air when the enamel was applied tended to form minute bumps on the finish, apparent to the eye, and made permanent when the part was dried in high temperature ovens. The enamel did not dry quickly in the air, and in spray booths it tended to deposit on the booth walls in a gluey mass to such an extent that the spray room and its ventilating system could be coated from top to bottom, resulting in inadequate ventilation, both from the standpoint of the process and comfort of the workmen. In case of damage to the finish of a synthetic enameled part, local touching up turned out to be insufficient; the whole piece had to be sanded and entirely refinished.

These problems, however, did not seem insurmountable to Chrysler Corporation Plymouth engineers.

In the first place, when synthetic enamel was adopted, it was recognized that new ventilation methods were necessary to eliminate all dust as completely as possible from the air. This was attained by the installation of

a ventilating system which introduced fresh filtered air into the spray room in quantities in excess of that being exhausted, thereby maintaining a slight pressure in the spray room and automatically forcing out any possibly dirty air. This system of necessity had a reasonably large capacity, since the spray room was not a sealed space, but had large inlets and outlets through which the materials to be painted moved on a continuous conveyor. These openings allowed considerable exfiltration.

In the second place, to correct the clogging of the walls and ducts by the excess enamel, the Plymouth engineers began experimenting with a spray booth which employed a water washed curtain, against which the excess paint spray impinged and was carried along with the water. In this experimental booth the excess paint-spray was passed through the water curtain and the pigment was washed out. The water, in which the waste paint was suspended, formed a sludge which was drained through a trench to a central sump.

In addition, in this wet booth, maintenance costs were reduced, clogging of walls and ducts eliminated, and the booth was easily kept clean. Also, exhaust air was cleansed, due to the washing out of the pigment from the exhaust, with resulting benefit to the neighborhood around the factory.

It was the development of the wet booth which paved the way for paint reclamation. In the first wet booths the paint sludge was skimmed and the solid matter thrown away. There was a considerable volume of this sludge, inasmuch as 35% of the paint applied with a

THIS INSTALLATION

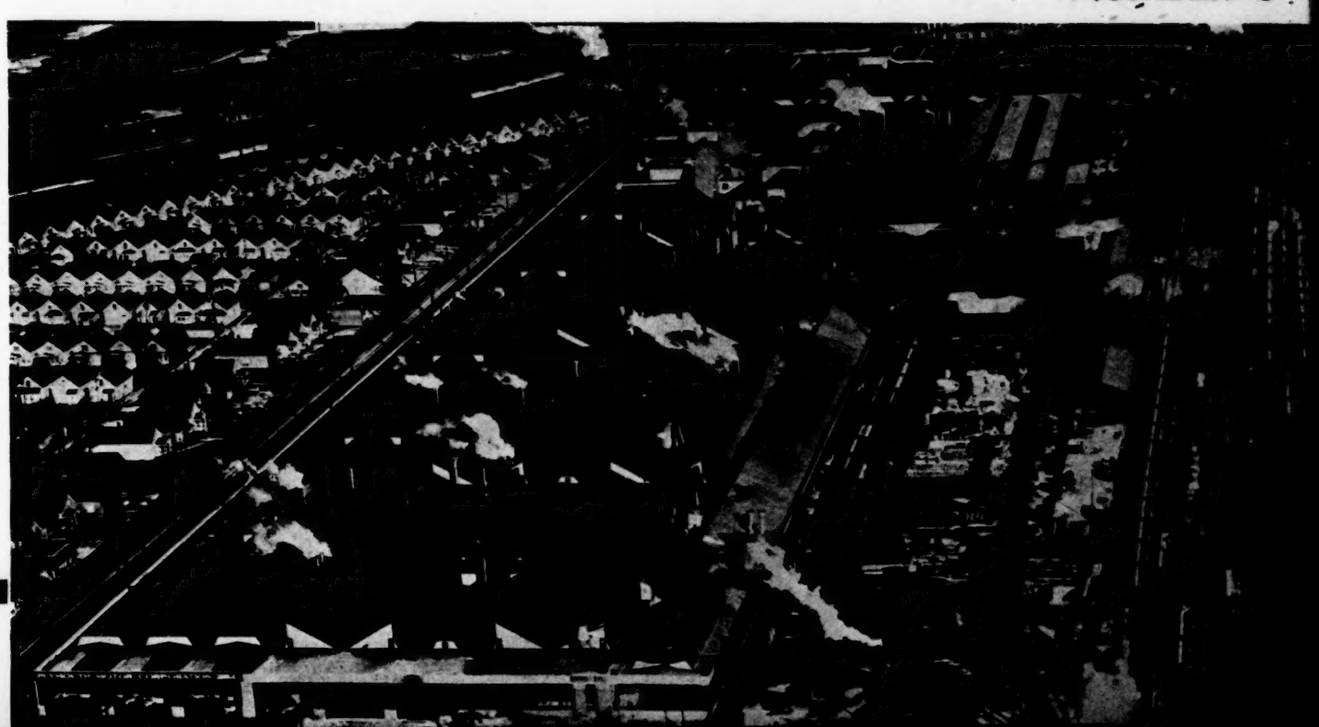
Owners—
Plymouth Division,
Chrysler Corporation, Detroit

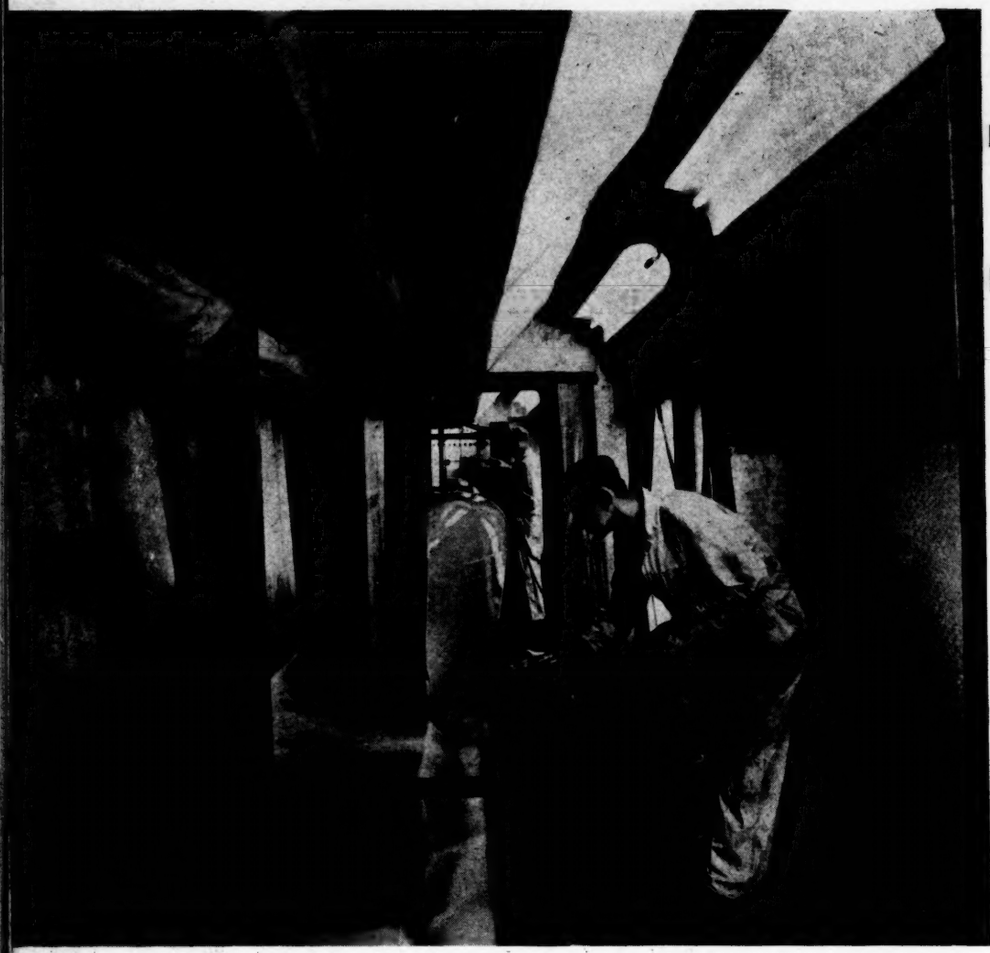
Engineers,
Paint Spray Ventilation—
Plant Engineering Dept.,
Plymouth Division,
Chrysler Corp.

Engineers, Heating—
Albert Kahn, Inc., Detroit

Air view of the plant of the Plymouth Division, Chrysler Corporation, Detroit.

NUMBER 6





The view in one of the paint spray booths showing the water curtain at the left. Note the adjustable curtain wall back of the operator.

PROFITS

spray gun was lost and carried away in the form of sludge. To try to correct this condition. Plymouth engineers began experimenting on a small scale with a domestic cider press. They found that the sludge could be freed of water and mixed with lacquer thinner. Analysis showed that the resulting paint had the same characteristics as new paint but, since the sludge was a mixture of various colors, its color was a neutral gray. However, this was no particular objection since a neutral color could be used as an undercoat on all parts and even for the finished coat on non-showing parts.

Thus paint re-claiming was developed and when used on a large scale, the sludge is fed to a double-acting piston pump, thence to a centrifugal separator to remove the water, and finally to a battery of mixing tanks. The reclaimed paint is then pumped back to those spray rooms where the prime coat is being applied. An enormous saving in paint cost obviously results.

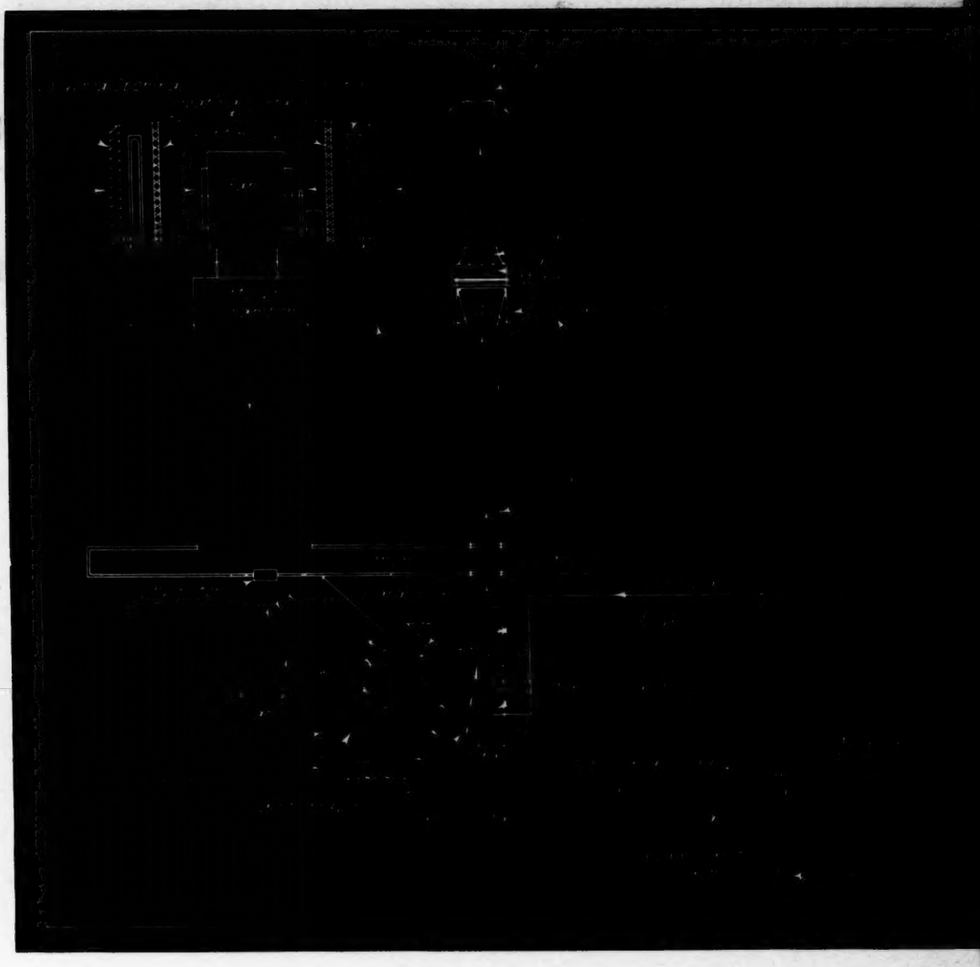
The new ventilation system previously mentioned and adopted when the wet booths were generally installed consisted of installing three fresh air supply systems located in three penthouses on the Plymouth roof. Outside air is drawn in through louvers, through continuous type oil air filters and across cast iron heating surface (supplied with hot water heated by exhaust steam from drop hammers), into double inlet fans and thence through a duct system to outlets in the spray rooms.

This system of ventilation, paint reclamation and wet booths was generally operated without important changes until last summer.

During the intervening five years, however, the automotive industry generally had made changes which ultimately affected the ventilation system of these spray booths. The changes were in car design. Streamlining had been widely adopted, and one result was that fenders, radiator shells, hoods, and other sheet metal parts to be paint-sprayed had become larger than formerly, and the spray booths were too small to handle these larger parts conveniently. During this period the popularity of the Plymouth car had consistently increased, too, and production had gradually been stepped up to more than 2000 cars per day. This portended for Plymouth more spray rooms; the larger parts meant that the spray rooms would be bigger; to supply more and larger rooms the engineers had to develop a ventilating system of greater capacity and efficiency. While planning this system their aim as always was to improve the working conditions of the workers.

Early in 1939, 16 new spray booths, 10 x 15 ft. in plan, were installed, and a new ventilating system was

IN AIR >

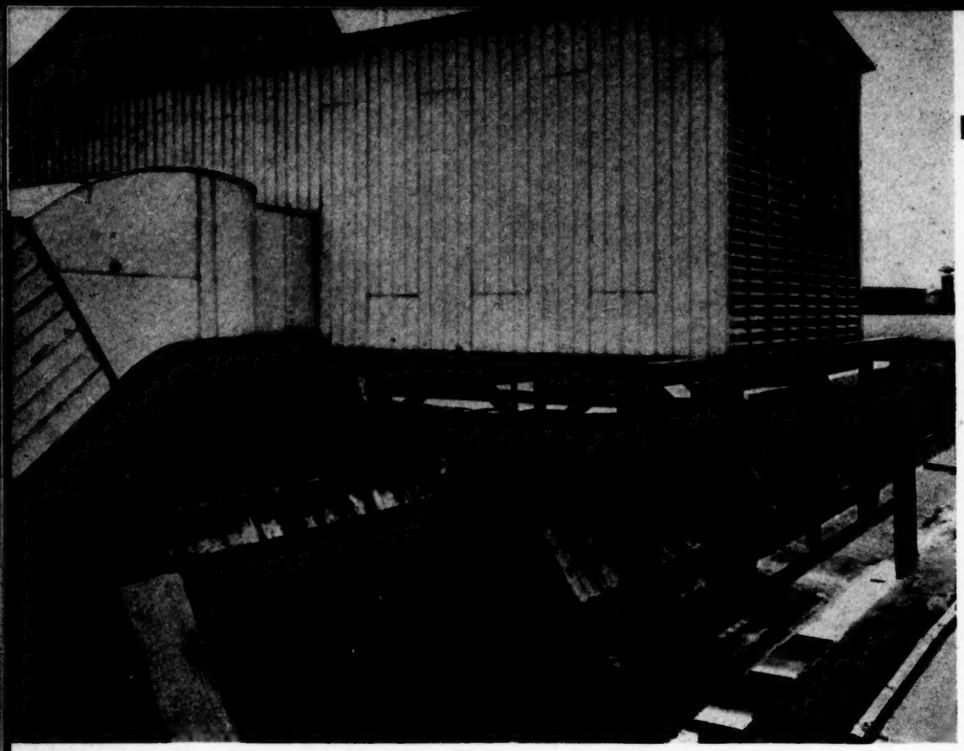


Schematic sketch showing arrangement of ventilating system for paint spray booths in the Plymouth plant.

built. This new system utilizes the old penthouses, fans, oil filters and heating surface, but an improved fresh air supply to the paint rooms was obtained by installing a false ceiling in the spray room to form a plenum chamber over the whole area; air is introduced into the room from the plenum through 300 dry type air filters which remove any dust which might have been introduced into the system after the air had passed through the oil filters. The system was designed so that the face velocity of the air through the openings in the booths is much higher than that required by any state code, and, in addition, 15,000 c.f.m. per man are now exhausted. The system operates at a lower pressure, and resistance has been cut from 4 to 1¾ in. of water. This being the case, no additional fan capacity is needed, although the volume of air now handled by the supply system is 300,000 c.f.m.—30% greater than previously. Actually, the power consumption of the supply fan motors is sharply less than formerly. With the low pressure supply system the air filters slowly into the room, and there is a constant pressure and even flow through the area.

As shown in the accompanying drawing, each spray booth has an adjustable panel behind the worker which the operator can adjust vertically so as to vary the proportion of air introduced into the booth at either the top or bottom, although the total amount introduced remains the same. Parts to be painted pass through the room hung from a continuous conveyor which is provided with an off-set hook so that paint will not reach the conveyor chain. The exhaust spray impinges on the water curtain and is washed into the water and sludge trench which drains into the sump. Air passing through this water curtain at the bottom of the booth is drawn through a duct in the back of the water curtain vertically and through a water spray to wash out any pigment which remains in the air stream. This water spray drains into the water and sludge trench from which it is finally pumped and returned to the spray nozzles. After passing the spray nozzles the air goes through a water eliminator of the helical type and is exhausted by a propeller type fan located on the roof.

Plymouth engineers claim that it is wrong to introduce air into the top of a paint spray booth and withdraw it from the bottom in order to form an air blanket to protect the worker from paint particles. With this method they say that the air stream would strike the part being painted, to be deflected, pick up paint, and spray back into the operator's face. Therefore, in the system described, all fresh air is introduced into the spray booth through the ends or the back. Their theory is that the air should be supplied in back of the work-



The roof penthouse housing the cast-iron heating surface and fans. The supporting of this housing on the roof raised a unique engineering problem. The roof trusses were not strong enough to support the penthouse and after investigation it was decided to weld additions to the columns, continuing them up to the trusses and roof so that a girder could be welded above the roof from column to column. Floor beams were welded to the girder and the penthouse which, with its equipment, weighed 20 tons, was placed on the floor beams resulting in a cantilever effect, so distributing the loads on the roof as to allow additional roof loading.

men, over his head and shoulders, then across the part being sprayed, and finally exhausted at the back of the booth.

With the old spray booths it was necessary to clean them and the exhaust ducts completely once weekly at considerable cost. Occasionally this had to be done every night. With the present system the spray booths now operate four weeks without cleaning, resulting in an important saving in maintenance expense and greatly improved working conditions.

To summarize, the Chrysler Corporation Plymouth installation has resulted in (1) materially improved working conditions for the paint sprayers and oven loaders; (2) an important reduction in power for the fresh air supply system; (3) elimination almost completely of rejection of parts because of dirt; (4) substantial lowering of maintenance expense, and (5) the production of cleaner sludge for re-working into paint. Here, then, is yet another case where industry is showing the benefits of improving its ventilating systems.

Air Conditioned Insects Save Pest Infested Crops

THE Dominion of Canada Entomological Building at Belleville, Ontario, contains 25 air conditioned rooms where parasites and insects are stored and developed. These parasites and insects are liberated in pest infested localities in an endeavor to counteract and eventually eliminate various forms of pests. In order that these parasites may be most successful, it is vitally necessary that they be released in the affected areas at the exact psychological time. Entomologists stationed at various places throughout the dominion are continually sending in reports on crop and pest conditions in their particular areas. When the correct time arrives, as shown by their reports, these parasites are rushed out by express for liberation.

According to Trane Weather Magic, five air conditioning units furnish correctly conditioned air to each of the 25 rooms. Each air conditioning unit incorporates direct expansion coils which are hooked up with three compressors installed in a separate equipment room. The compressors are arranged in such a way that one, two, or three of the machines may be used to carry the refrigeration load as required. The control system on the compressors is such that only one machine will operate when one machine can carry the load. A second machine will cut in automatically if increasing outside temperature conditions and other influencing factors should demand. The third machine is similarly set up, but generally speaking, is used as a stand-by.

The parasites are stored in these 25 different rooms at a quite low temperature in order that they remain dormant until the time comes for shipment. When this time arrives, the conditions in the rooms are gradually brought up to a relatively high temperature and humidity which arouses the parasites from their dormant stage. The conditioning units supply air to the main ducts at the lowest temperature and dew point required in any of the rooms served by a particular machine. Reheating coils in the branch ducts to the individual rooms then bring the air up to a required room temperature. Conditions required in these various rooms vary from 50° D.B., 40° dew point to 80° D.B., 50% relative humidity. As there is no individual room control over the entering air dew point, the room usage must be so grouped that all rooms on one unit require the same dewpoint temperature. This dew point temperature is varied at the conditioning units by controlling the refrigerant temperature.

NEWS OF THE MONTH

AGA Urged to Aggressively Promote Air Conditioning with Gas; Committee Recommends National Educational Campaign

NEW YORK—"Existing marketing methods have failed to produce a significant sale of gas-using summer air conditioning equipment... and we are convinced that the major weakness in the present set-up has been the lack of organized and unified effort on the part of the gas industry to obtain air conditioning business." Upon this thesis, the Industrial and Commercial Air Conditioning Committee, Industrial Gas Section, American Gas Association, has made a recommendation to the industry through its 1939 report, which proposes the official establishment of a national gas-industry agency to coordinate activities of all gas companies and manufacturers of gas-using equipment.

Nor was this suggestion born without careful analysis of the field by experts over a period of time. Both the 1938 and 1939 yearly reports of the Committee, chairmanned by Charles R. Bellamy, Columbia Gas and Electric Corporation, are complete, and go into both technical and merchandising details of the possibilities of air-conditioning with gas.

Air conditioning today has, according to the committee, become accepted to the point where the purchaser is interested in buying results at a reasonable cost without caring to, or being able to, inquire into the methods used to obtain them. The sixty or eighty million dollars worth of annual business currently being done by the entire air conditioning industry is possible, not only because the nationally recognized manufacturers have large and efficient sales and engineering organizations handling large contract work on a direct basis, but primarily because these and other manufacturers obtain distribution through at least 1500 retail engineering-contracting concerns throughout the country. If the gas industry is to obtain its share of the air conditioning business, it must either, develop a distribution organization capable of competing with this aforementioned one, or else must see that gas products are placed in the hands of the existing engineer-contractor organizations for sale by them, the committee says.

The committee recommends that every effort should be made to utilize the existing marketing facilities, and that, therefore, the problem of the gas industry is to develop acceptance of gas equipment by existing air conditioning distribution outlets, and to further assist them in obtaining public acceptance for gas-fired equipment. The first step should be an organized campaign of engineering education addressed to the air conditioning industry by the gas industry to be executed by the agency recommended by the Committee.

In addition the committee recommends the six following points of action:

(1) Through this agency, distribute unbiased and current factual data on available equipment and methods; present and potential markets; factors which influence choice of equipment and methods; proven promotional and selling plans.

(2) Through within-the-industry propaganda and general educational activity, sell the more aggressive gas companies on the absolute importance of assigning one or more qualified men to the full time job of emulating locally what the agency is doing nationally.

(3) With this newly acquired individual gas company effort, properly guided within the industry, comprehensive local surveys can be made upon which to base the need, extent and direction of local promotion.

(4) Where justified by territorial surveys as to potential markets for gas air conditioning, every gas utility concerned should air condition its sales offices.

(5) The choice of equipment and methods for these demonstration installations should obviously be typical of the needs for the territory involved—after giving full consideration to comparative costs of utility service, availability and temperature of water supply, and local climatic conditions.

(6) The choice as to type of organization employed to engineer and install gas company air conditioning jobs should be predicated upon local as well as national reputation, together with the facilities that can be offered to carry on a continuing selling, engineering, contracting and servicing program in cooperation with the local utility. This is vital.

St. Louis Stoker Men Elect Hanson

ST. LOUIS—Early in December the St. Louis Stoker Association elected its officers for 1940 and the installation of the officers was held at a meeting on December 6 at the Kingshighway Hotel, attended by about 140. The new officers are: J. Harold Hansen, president; C. H. Schuettenberg, vice-president; George A. Hale, executive secretary.

$200,000 Award Program Planned

CLEVELAND—A 2½-year program of scientific study, which will culminate in payment of $200,000 in awards, and which should produce widespread social and industrial benefits, has been announced by The James F. Lincoln Arc Welding Foundation. The 458 awards are established for studies bringing out benefits of a social, economic or commercial nature, such as reduction or elimination of hazards to safety and health, greater availability of comforts and conveniences through reduced prices, greater utility and durability of machines and structures as well as industrial benefits such as cost savings and other advantages in manufacture or fabrication.

Studies encouraged with a view to creating such large-scale benefits will concern machines, products and structures of all types including: automobiles, trucks, buses, airplanes, locomotives, buildings, bridges, houses, furniture, heating and air conditioning equipment, electric refrigerators, as well as industrial machines and products of every conceivable kind.

Myers and Young Address Bureau

BOSTON—An outstanding program featured the Dec. 12 meeting of the Air Conditioning Bureau. The guest speakers were S. F. Myers, sales development manager of the air conditioning department, Westinghouse Electric & Manufacturing Company, Springfield, and Dr. Albert G. Young, medical director of the Corey Hill Hospital, Brookline.

Mr. Myers spoke of "Recent Developments in Unit Equipment." His illustrated talk dealt with the manufacture and standardization of unit equipment, as well as the sales possibilities of various applications and assemblies in the field.

Dr. Young's subject was "Can Air Conditioning Affect the Occurrence of the Common Cold?" He discusses this subject of popular interest as another one of his series of progressive talks on the physiological aspects of air conditioning, his continued research at Corey Hill Hospital, which is completely air conditioned, having already made him an outstanding authority on this subject.

Mills Addresses Detroit Group

DETROIT—Russell Mills of the Ford Motor Company addressed the Michigan chapter of the ASHVE at its monthly meeting in November. There were 138 members and guests present.

Mr. Mills spoke on the unusual air conditioning and ventilation problems encountered in the Ford plant.

Pittsburgh Contractors and Union Consent to Judgment in Government Action Against Building Industry

PITTSBURGH — Thirty individuals, mostly heating and piping contractors, 18 corporations and an A.F.L. union agreed to a consent judgment perpetually enjoining them from certain so-called price-raising practices named in a suit instituted by the U. S. Department of Justice December 7. The suit is designed to break up "unlawful combination and conspiracy" which has "restrained and burdened" the construction business in Pittsburgh, according to Government attorneys. The action is not a criminal proceeding.

This development revealed a new line of strategy in the Government's trust-busting crusade, progressing simultaneously in 15 key cities, against restraints which the Government claims have muffled a long-anticipated building boom.

Although initiated by the same Department of Justice attorneys who are conducting the Grand Jury investigation of the building costs here, the injunction suit, based on the Sherman Anti-Trust Act, was independent of the probe.

With their bill of complaint, U. S. attorneys filed in Federal Court a stipulation of facts, which obviated the necessity for a trial, and a form of judgment which has been approved by the defense attorneys. The judgment became effective immediately.

P. J. Heenan was both counsel and defendant in the action. As an attorney, he represented 33 contracting firms or individuals responsible for 95% of heating and ventilating installations here—the Voluntary Code of the Heating, Piping and Air Conditioning Industry for Allegheny County; the Heating and Piping Contractors' Pittsburgh Assn., and himself as secretary of the Voluntary Code and of the trade association.

C. P. Bailey represented A. F. of L. Steamfitters' Local 449, all its officers, executive committeemen and members, and the union-owned United Heating Co., whose purpose, the Government charged, was to underbid any outside contractor who attempted to operate here without joining and paying fees to the Voluntary Code.

According to reports, results of the consent judgment were:

1—Immediate dissolution of the Voluntary Code.

2—Dissolution of United Heating Co. by March 1.

3—Abrogation of all agreements limiting employment of Local 449 members to members of the Voluntary Code or the Contractors' Assn.

4—Perpetual barriers to a resumption of any of the multiple restrictive practices enumerated in the complaint.

The stipulation of facts, it is reported, put both sides on record as admitting these points:

1—That the contractors operated under a closed shop contract with Local 449.

2—That the union since Aug. 5, 1937, has refused to supply labor to any contractor who was not a member of the Code or the Association.

3—That the Voluntary Code collected from its members a fee of ½ of 1% of contracts over $250. PWA projects alone were excepted.

4—That all but PWA bids were submitted to a bid depository, where they were "opened, tabulated and made available to" all other members of the Voluntary Code, with the object of keeping prices higher than they otherwise would be if competition were free.

5—That Local 449 authorized use of funds from the union's treasury to absorb operating losses of United Heating Co. in its campaign against "outside" contractors.

The cumulative effect of these practices, it was charged, was to restrain the flow of interstate and intrastate trade and commerce, to freeze out non-union contractors and workmen and to prevent direct-to-consumer sales of materials and supplies.

"The defendants have conspired together as aforesaid," the complaint alleged, "with the purpose and intent of unlawfully—

"A—Monopolizing for the benefit of the members of the Voluntary Code, and of the Contractors' Assn., to the exclusion of substantially all other heating contractors, the sale and installation of heating equipment in the City of Pittsburgh;

"B—Raising prices of heating equipment and installation services, as described above;

"C—Obstructing and eliminating the purchase of heating equipment by general contractors or builders direct from manufacturers or from dealers who are not members of the Voluntary Code;

"D—Preventing heating contractors having their principal place of business outside the Commonwealth of Pennsylvania from coming into the City of Pittsburgh, competing therein for the business of furnishing heating equipment and services, and transporting heating equipment in interstate commerce into the said city, and

"E—Interfering with and restraining interstate trade and commerce in heating equipment."

Cornell Completes A.C. Test Lab.

ITHACA — Cornell University's new constant-temperature room, embodying innovations in design which facilitate research in air-conditioning, heat transfer and related fields, has been completed and will be in operation as soon as further special equipment has been installed. It is particularly well adapted for investigations of thermal conductivity, temperature and air distribution, condensation within walls, panel heating and cooling, radiator effectiveness, psychrometric measurements, and similar problems.

The testing room is 26 x 29 x 12 feet. The walls, ceiling, and floor are insulated with 8 inches of cork. A cooling room and instrument room are also provided. The testing room is completely free from heating and cooling apparatus, a novel feature that eliminates an important source of possible error in experiments, since radiation from such apparatus may greatly affect the accuracy of temperature readings. In the Cornell laboratory, the heating and cooling apparatus is outside the testing room, and the conditioned air is carried through a specially constructed duct. Not only the temperature and humidity, but also the rate of circulation of the air can be accurately controlled, and special apparatus assures even distribution of air throughout the room.

The constant-temperature room was constructed from designs prepared by Professor W. M. Sawdon and Dr. David Dropkin of the staff of the College of Engineering.

City May Adopt Installation Rules

TORONTO—The regulations covering the installation of warm air, hot water and steam heating systems drawn up by the committee on property for the City of Toronto, have been submitted to the Ontario chapter, ASHVE, and favorably passed upon. It was generally felt by the City Council and various heating engineers that it is essential in the public interest to control abuses on heating equipment. J. W. Bruce, on behalf of labor organizations, pointed out that 24 lives have been lost in 10 years in Toronto due to defective heating equipment and that protection was necessary for residential heating installations, as well as industrial plants.

While inspectors will not examine each job under the regulations, a competent engineer will be sent to any home, office or factory from which a complaint is received. If it does not conform to the standards, the engineer, contractor or installer, will be held entirely responsible for the deficiency and legal action may be taken against the offender.

Florist Conditions Delivery Truck

LOS ANGELES—Armacost and Royston, Inc., local wholesale flower firm, has concluded a series of tests to determine the effectiveness of conditioning delivery trucks. The tests were made to learn the practical value of air conditioning as a whole for flowers in transit on short intra-city hauls, as well as to determine the most suitable type of air cooling under prevailing conditions in the company's delivery system which, in the past, had made difficult the maintenance of uniform temperatures.

The firm's trucks, in making deliveries to retail flower shops, are compelled to make frequent stops during which the door is open for periods ranging from ten to fifteen minutes each, causing a rise in temperature in the truck. It seems desirable to devise some conditioning method for maintaining uniform temperatures.

The firm began its series of experiments by adding an insulated delivery truck to its facilities. Insulation consists of a two-inch layer of cork on floor, ceiling and the walls. For conditioning purposes a small truck-cooling unit was installed, which, by means of a fan driven by a small motor, forces cooled air from an ice bunker over the load of flowers. The ice is contained in a metal bunker affixed to the front wall of the truck.

The tests included comparisons of flowers carried in the air-conditioned truck with loads in trucks which had not been cooled. The tests were regarded as satisfactory from the firm's standpoint, disclosing, for instance, that roses in the air-conditioned truck maintained condition and color better than in trucks that had not been cooled, and that orchids and asparagus fern could be delivered fresher.

It was determined, also, that the simple circulation of iced air was the most effective conditioning method for counteracting rising temperatures during the frequent door-openings, for this practice reduced the temperature quickly without sacrificing humidity.

Armacost and Royston, Inc., is an extensive grower of orchids and roses, operating a 19-acre tract of the former in West Los Angeles. The air conditioned truck was found ideal for preserving the delicate condition of orchids in transit.

Thorley Establishes Own Business

BOSTON—Albert Thorley, well known in the heating and ventilating industry in Boston for the past 25 years, and recently with Pierce & Cox in charge of the heating department, has established the Albert Thorley Co., engineers and contractors, with offices at 72 A St., Boston.

Dealer Protests Flint Ordinance

FLINT, MICH.—Testimony that an association of heating contractors had drafted and succeeded in having adopted an ordinance designed to force small contractors out of business was offered before Circuit Judge Philip Elliott Dec. 11 in a suit seeking to invalidate the City's heating ordinance.

George Gilcher, a heating contractor, testified that at meetings of the Flint Warm Air Heating Association he had heard statements that the ordinance "was to put little contractors out of business." He stated that he had later resigned from the association because it was setting prices.

He admitted that he had twice failed to pass the examination required in the act for the licensing of warm-air heating contractors.

Noble Carpenter, a heating contractor, member of the licensing board and former officer of the heating association, also testified before attorneys for Smith rested their case late Monday afternoon. Carpenter declared that the association, which he said had about 15 members, drafted the licensing ordinance and submitted it for approval of the City Commission without help from City officials.

He denied that the licensing board, which includes two contractors, an architect, a bank cashier and a building inspector, had made any attempt to discriminate against any contractor. The examinations, he said, are of a practical nature.

Make A.C. Mandatory, Doctor Says

BUFFALO—A drive in the interest of "better health" for a city ordinance making it mandatory for all homes and business establishments to have some form of air conditioning, is being made here by Health Commissioner Francis E. Fronczak. "Air conditioning for the home, as well as business houses," he said, "cannot be stressed too highly. It is something that has to be brought about from a health standpoint, and we are now making plans to introduce a section in the city ordinance making such equipment in homes and business places mandatory.

"The alarming number of illnesses, due to the varied respiratory diseases, is the reason for this step. These, with proper air conditioning, can be cut down to a minimum. As a matter of fact, we believe such illnesses can be practically eliminated with the adoption of such a city ordinance as we propose."

Dr. Fronczak also pointed out that hay fever sufferers would also no longer have to fear rag weed pollen annually if they live in air conditioned homes and do their work in air conditioned places of business.

Cooney Elected by Buffalo Council

BUFFALO—Edwin R. Cooney of the Cooney Refrigeration Company was elected president of the Air Conditioning Council of Western New York at the annual meeting in the University Club Dec. 18. The meeting was held jointly with the Buffalo chapter of the ASHVE.

Other new officers elected at the board of directors' meeting were Richard H. Mollenberg of the Mollenberg Betz Machine Company, vice-president, and Lars Hedstrom of the General Air Conditioning Company, treasurer. Walter P. Davis was reappointed executive secretary.

At the general meeting earlier in the evening the following new directors were elected to serve two-year terms: Roswell W. Farnham of the Buffalo Forge Company; H. L. Householder of the Householder Heating Corporation; Arnold R. Kamman of A. R. Kamman Company; Mr. Cooney, Mr. Mollenberg and Mr. Hedstrom.

Secretary Davis reported that about twice as much tonnage in air conditioning equipment was sold in Buffalo in 1939 as in 1938, mostly in large installations, and predicted an even bigger volume of business in 1940.

A.C. Shares Honors with Milk

SYRACUSE—Air conditioning and milk drinking share honors today in averting lead poisoning for 16 years in the decalcomania lithograph department of the Onondaga Pottery Company.

A. J. Koch, manager of the decalcomania department, which made air conditioning history 16 years ago by installing the first centrifugal refrigerating machine developed by Carrier, disclosed this remarkable health record recently.

Colors used in producing decalcomania are made from a metallic dust which must be kept at temperatures below 75F to assure a minimum diffusion into the air, he said. It has been found that dusts used in such plants have caused lead poisoning among workers exposed to the dust.

"Since installing the air conditioning 16 years ago," Mr. Koch explained, "there has been no case of lead poisoning. I attribute this fine record partly to air conditioning and partly to the practice of having employees drink milk at regular intervals during the day."

It was because of this dust that an unusual exhaust system was installed, he added. Air drawn from the room is passed through an air washer where the dust is removed and then the air discharged to the outdoors. While usually air is washed to reclaim dusts, in this case it is necessary to prevent the contamination of the outside air immediately adjacent to the plant.

Hospitals Are Aided by PWA

WASHINGTON—Acting Commissioner of Public Works Col. E. W. Clark reported to Federal Works Administrator John M. Carmody on November 5 that PWA has provided 35% of the total increase in hospital facilities in the nation since 1933.

There have been 743 non-Federal hospital projects in 47 states and territories, involving work on 2046 hospital buildings with a capacity of 107,849 beds. PWA made grants of $151 million toward total costs of $397 million. Col. Clark pointed out that the majority of the non-Federal projects involving new buildings were located in smaller communities throughout the country where adequate hospital facilities in many instances were made available for the first time.

Heckel Opens Consulting Offices

CHICAGO—E. P. Heckel, who has for many years been identified with general air conditioning, refrigeration and industrial process engineering work, now has offices and engineering staff in association with Samuel R. Lewis, of Chicago, 407 S. Dearborn St.

Mr. Heckel's New York City associate is Harry Boyd Matzen, 185 Madison Avenue. The consulting business will be conducted in the name of E. P. Heckel & Associates and will be devoted primarily to air conditioning and refrigeration in all its phases, industrial processes as well as comfort cooling. Mr. Lewis will continue his consulting business as heretofore in his own name.

To Study Effect of A.C. on Avocados

LOS ANGELES—A study of ventilation and refrigeration problems of avocado fruits in transit has been launched by the Los Angeles County Farm Bureau for collecting data to be presented to the U. S. Department of Agriculture. R. E. March, chairman of the avocado department of the farm bureau, has appointed a special committee of ventilation and refrigeration authorities to gather southern California data, which are then to be presented to the Department with request that a government supervised survey of conditioning of avocados be made.

Ferguson to Build B. & W. Office

CLEVELAND—Contract has been awarded to The H. K. Ferguson Company for the design and construction of an office building at the Barberton, Ohio, plant of The Babcock & Wilcox Company. The building is 2-stories, 56 x 122 ft., of brick and steel to match existing structures, and is designed for future air conditioning.

Camden Plant Engineers Organize

CAMDEN, N. J.—A Camden County unit of the National Association of Power Engineers was organized here December 19. With a charter list of 80 engineers, the new association will be officially instituted Jan. 13 at a meeting here, in which national officers from Pittsburgh and Chicago are scheduled to officiate.

Officers of the new group have been named as follows: president, William Andrews, assistant chief engineer at the local RCA plant; vice-president, Jerome Tulk, Campbell Soup Co.; corresponding secretary, John M. O'Leary, Cooper Hospital; recording secretary, Raymond A. Lott, Atlantic Refining Co.; financial secretary, Clefton V. Johns, Camden Refrigerating Co., and treasurer, Richard Nicholas, Walt Whitman Hotel. Trustees elected include Howard Lafferty, U. S. Cast Iron Pipe Co.; Fred C. Whittemore, RCA, and Arthur Rush, Eavenson & Levering.

A.C. for Tiffany's New Building

NEW YORK—Refrigeration equipment with a capacity of 400 tons of ice daily, and with 128,000 c.f.m. of air introduced into the various conditioned spaces are features of the air-conditioning system which is being installed in the new Tiffany & Company building at Fifth Avenue and 57th St. The contract for the heating, ventilating and air-conditioning work on the project has been awarded to Baker, Smith & Company, Mr. Cross announced. The consulting engineers are Jaros, Baum & Bolles.

Emphasizing that not just the sales floors but that the entire building will be air-conditioned, Mr. Cross pointed out that the structure will be one of the first major store buildings in the metropolitan area in which the air-conditioning design is an integral part of the basic construction. This factor, he declared, has enabled architectural and engineering planning to incorporate features in the design which register important advances in the development of the art of air-conditioning.

$7Million for Chain Store A.C.in '38

NEW YORK—Chain store companies spent a total of $126,159,914 for remodeling old stores and constructing new ones this year, according to the annual chain store modernization study made by *Chain Store Age*. This total is 12.2% higher than the amount spent in 1938 and is the highest recorded since the first study of the kind made in 1933, running 1.3% above the previous high figure of 1937.

Expenditure by all chains for air conditioning was $7,578,357 this year.

Giesecke Addresses Toronto Group

TORONTO—Over fifty members of the Ontario chapter, ASHVE, were present at the November meeting held recently in the Royal York Hotel. The speaker was Prof. F. E. Giesecke, first vice-president of the parent society and 1940 presidential nominee, who discussed Radiant Heat and Cooling. He stated that owing to the lighter building construction in Texas air-conditioning is more costly than in Canada where solid buildings are the rule. Better building would lower the cost of air-conditioning both in installation and operation and make it more popular, he said.

H. D. Henion, president of the chapter, reported that the society's heating code committee was co-operating with K. S. Gillies, building commissioner in Toronto, in drafting a heating by-law to be given consideration for adoption in the City of Toronto.

John F. G. Miller

John F. G. Miller

BOSTON—John F. G. Miller, vice-president of B. F. Sturtevant Company, Hyde Park, 62 years of age, died suddenly December 9 of a heart attack at his home in Brookline.

Mr. Miller became associated with the B. F. Sturtevant Company in 1933 as vice-president in charge of sales, advertising and sales promotion. Prior to his affiliation with Sturtevant, Mr. Miller was vice-president and general manager of American Blower Corporation, Detroit, and a member of its Board of directors.

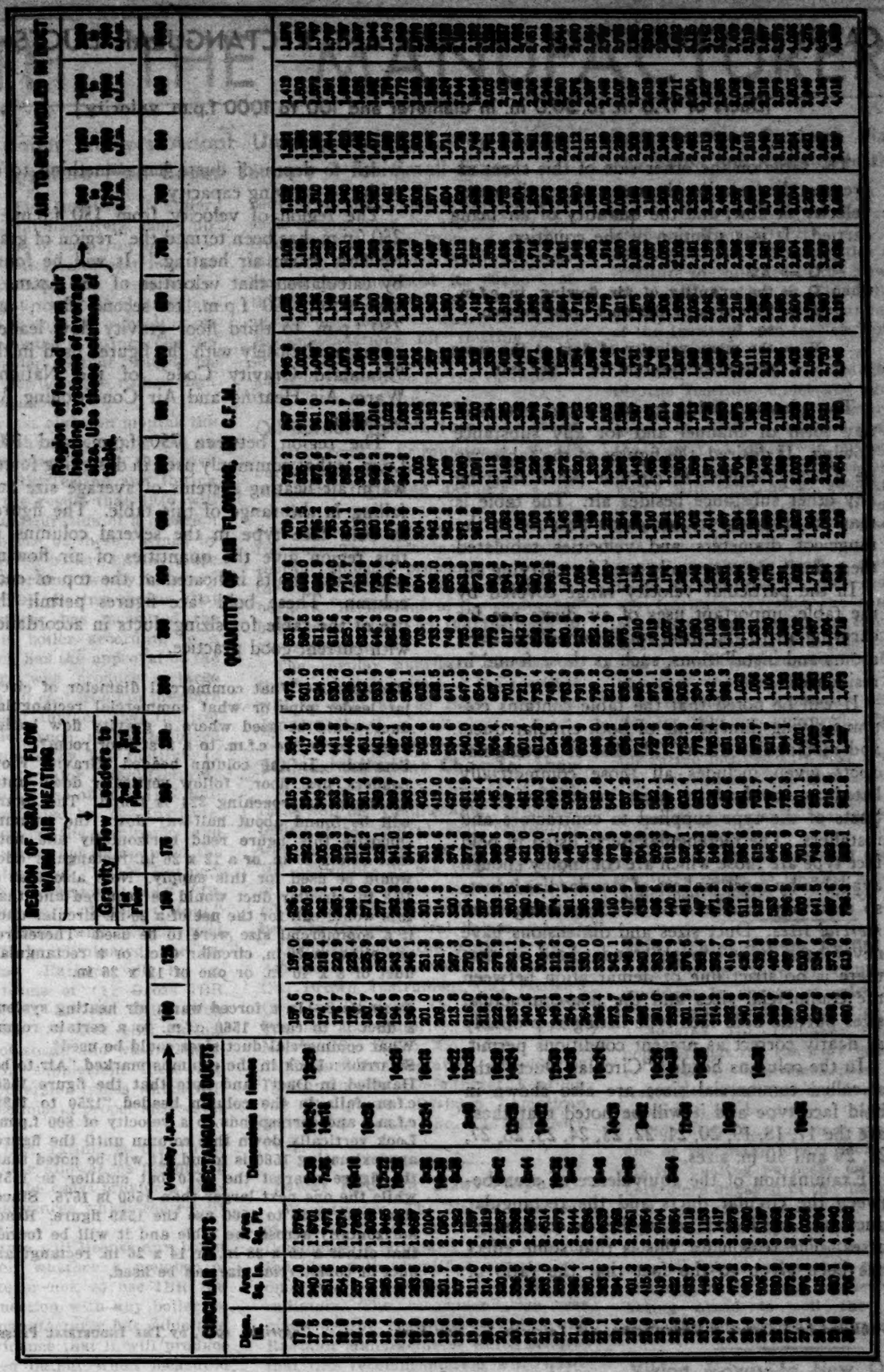
Of his many accomplishments during his association with Sturtevant, he was particularly pleased with the effectiveness of the student sales engineering course, which he inaugurated in 1934, in training and developing many promising young sales engineers.

In his 36 years of activity in the fan and air conditioning industry, he became widely known and highly regarded for his forceful personality, high integrity and executive ability. He was especially active and influential in trade association matters, having been a past president and director of the National Association of Fan Manufacturers, chairman of the board of directors and past-president of the Air Conditioning Manufacturers' Association, and vice-president of the Industrial Unit Heater Association.

Mr. Miller was a graduate of Purdue University, class of 1903, where he was a four-letter man and captain of football, track and basketball teams. He is survived by his widow and two brothers.

CARRYING CAPACITY OF CIRCULAR AND RECTANGULAR DUCTS—5

(Ducts of 17.0 in. to 30.0 in. in diameter and 100 to 1000 f.p.m. velocity.)


AIR TEMPERATURE HANDLED IN DUCT
Region of forced warm air heating systems of average size. Use these columns of table.
REGION OF GRAVITY FLOW WARM AIR HEATING
Gravity Flow Leaders to
1st Floor
2nd Floor
3rd Floor
QUANTITY OF AIR FLOWING, IN C.F.M.
Velocity, f.p.m.
RECTANGULAR DUCTS
Dimensions in inches
CIRCULAR DUCTS
Area Sq. Ft.
Area Sq. In.
Diam. In.

Published by HEATING & VENTILATING, *148 Lafayette St., New York.* 1/40 *Copyright, 1940, by* THE INDUSTRIAL PRESS

H. & V.'s REFERENCE DATA—165

CARRYING CAPACITY OF CIRCULAR AND RECTANGULAR DUCTS—5

(Ducts of 17.0 in. to 30.0 in. in diameter and 100 to 1000 f.p.m. velocity.)

The table on the other side of this sheet expresses the relation between duct diameter, velocity of flow, and the quantity of air being carried. It is a solution of the equation

$$Q = AV$$

when Q = the quantity of air flowing, in c.f.m.,
A = The area of the duct cross section, sq. ft.
V = the mean velocity of flow at the cross section in question, in ft. per min.

The equation holds for any cross section of any form of channel and for any substance flowing. If desired, the figures of the table can be directly applied to circular pipes carrying any other substance besides air. The table is marked as being for air ducts because in the range of diameters and velocities tabulated these ducts are commonly used for carrying air.

In the particular velocity range covered by the table, important uses of air ducts are for carrying air to and from small to medium sized rooms and installations, such as those found in residences.

It will be noted that the table contains columns giving dimensions of both circular ducts and rectangular ducts. The list of rectangular ducts given includes all those commercially listed as *standard* by most manufacturers of ducts of the type supplied to contractors and installers. The rectangular ducts listed in bold face type are those which are commonly enough available by most makers of standardized ducts so that they can be considered as being *commercial sizes*. Duct sizes and dimensions have never been fully enough standardized so that there is no strict line of demarcation between the commercial sizes and the non-commercial sizes but the bold face type listing is probably as nearly correct as present conditions permit.

In the columns headed "Circular Ducts" the so-called commercial sizes are also shown in bold face type and it will be noted that these are the 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 and 30 in. sizes.

Examination of the equivalence of area between the circular ducts and the rectangular ducts will be found not to be exact in some cases. The reason for this is that some effect has been given to the fact that the ratio of width to depth of ducts has something to do with the carrying capacity.

The region of velocity from 150 f.p.m. to 250 f.p.m. has been termed the "region of gravity flow warm air heating." It will be found by calculation that velocities of 150 f.p.m. to first floor, 200 f.p.m. to second floor, and 250 f.p.m. to third floor gravity flow leaders correspond closely with the figures used in the "Standard Gravity Code" of the National Warm Air Heating and Air Conditioning Association.

The region between 750 f.p.m. and 1000 f.p.m. is that commonly used in designing forced warm air heating systems of average size and falling in the range of this table. The figures in bold face type in the several columns in this region give the quantities of air flowing within the limits indicated at the top of each column. These bold face figures permit the use of the table for sizing ducts in accordance with current good practice.

Example 1.—What commercial diameter of circular leader pipe or what commercial rectangular duct would be used where a gravity flow leader has to carry 324 c.f.m. to a first floor room?

SOLUTION: In the column headed "Gravity Flow Leaders, first floor," follow vertically down until the figure approaching 324 is found. The figure will be found about half-way down the column. Opposite this figure read horizontally and note that an 8 x 40 in. or a 12 x 26 in. rectangular duct would be used for this supply. Note also that a 19.9 in. circular duct would be required and that this would call for the use of a 20-in. circular duct if a commercial size were to be used. Therefore, use either a 20-in. circular duct, or a rectangular duct of 8 x 40 in. or one of 12 x 26 in.

Example 2.—In a forced warm air heating system a duct is to carry 1560 c.f.m. to a certain room. What commercial duct sizes could be used?

SOLUTION: Look in the columns marked "Air to be Handled in Duct" and note that the figure 1560 c.f.m. falls in the column headed "1250 to 1599 c.f.m." and corresponds to a velocity of 800 f.p.m. Look vertically down this column until the figure approximating 1560 is found. It will be noted that the figure nearest the 1560 but smaller is 1559 while the one next larger than 1560 is 1575. Since this is so close to 1560 use the 1559 figure. Read horizontally across the table and it will be found that either a 10 x 28 in. or 14 x 26 in. rectangular duct of *commercial* size can be used.

Published by HEATING & VENTILATING, *148 Lafayette St., New York.* 1/40 *Copyright, 1940, by* THE INDUSTRIAL PRESS

WITH THE MANUFACTURERS

Cast Iron Boiler Makers Adopt Uniform Boiler Rating Code; New Institute Plan Began January 1 for Small Sizes

NEW YORK—The Institute of Boiler and Radiator Manufacturers, made up of manufacturers of cast iron low pressure heating boilers and cast iron radiators, recognizing the need for a reliable and uniform method of determining boiler ratings, at a meeting on December 7 adopted a rating code for measuring boiler output based on actual boiler performance rather than on boiler dimensions.

During the last eighteen months the manufacturers have been engaged in testing boilers according to the provisions of the IBR Testing and Rating Codes, with the result that 1940 will witness the inauguration of a program involving the use of these ratings by manufacturers on boilers having grate widths not exceeding twenty inches.

The term IBR Rating means that the manufacturer has measured the output of his boiler according to a formula which has the approval of the manufacturers who produce a large percentage of all cast iron low pressure heating boilers; further, that the test data on which such rating is based has been reviewed by The Institute of Boiler and Radiator Manufacturers and a license for use of such IBR Rating has been issued by The Institute.

By this means the confusion and uncertainty which has surrounded the use of such terms as "E.D.R. Rating," "Net Load," "Radiator Load," "Installed Radiation," "Rated Output," "Guaranteed Load," and "Commercial Rating," will be eliminated, the Institute claims. Ratings will be expressed in terms of (1) Gross IBR output in B.t.u.; (2) Net IBR rating in B.t.u., and (3) Net IBR rating, square feet of steam and water. Manufacturers will supplement these ratings with conversion tables which will simplify selections of proper size water boilers.

The net IBR rating is the Gross IBR output less allowances for piping and pickup. The codes provide a basis for these allowances which represents a safe average.

The Institute will license any boiler manufacturer, whether a member of the Institute or not, to use IBR ratings in connection with any boiler on which the manufacturer has submitted adequate evidence that it will produce the indicated output when measured by the terms of the codes. Boilers so rated will be marked with the IBR emblem, which is a registered mark of the Institute.

The Institute believes that the use of these ratings marks a long step in the advancement of radiator heating because of the confidence with which such ratings may be accepted by the trade. The Heating, Piping & Air Conditioning Contractors National Association has indicated its support of this program and will use IBR ratings in the next issue of their "Net Load Recommendations for Heating Boilers" on boilers for which IBR ratings have been approved by the Institute.

Oil Burner Manufacturers to Meet

NEW YORK — A conference of oil burner manufacturers will be held at the Hotel Cleveland January 24, according to an announcement by President Frank H. Dewey of Oil Burner Institute. The conference will consider current industry problems as well as the new commercial standards for oil burners. Invitations to the conference have been issued by the Institute to all manufacturers.

The regular quarterly meeting of the Board of Directors of the Institute will be held at the Hotel Cleveland January 25.

300 Exhibited at Chemical Show

NEW YORK—Manufacturers of apparatus for air conditioning, automatic temperature control and ventilating were prominent among the more than 300 exhibitors at the 17th Exposition of Chemical Industries which concluded a successful six-day run December 9 in Grand Central Palace.

Included among the exhibitors were: American Air Filter Co., Inc., Bristol Co., Brown Instrument Co., Foxboro Co., Inc., Grinell Co., Inc., Illinois Testing Laboratories, Inc., Bailey Meter Co., Sarco Co., Inc., C. J. Tagliabue Manufacturing Co., Taylor Instrument Co., DeBothezat Ventilating Equipment Division, American Machine & Metals, Inc., and Pangborn Corp.

Fewer Radiator Sizes Proposed

WASHINGTON—The National Bureau of Standards of the Department of Commerce is circularizing the heating industry with simplified practice recommendation for large tube cast iron radiators. The recommendation was made by the Institute of Boiler and Radiator Manufacturers which believes that this recommendation will constitute a sound basis for the concentration of production on a minimum number of sizes so that the result would be maintenance of lower inventories by jobbers and distributors, assurance of prompt deliveries, and simplification of specification.

Radiator Heat Research Planned by Boiler and Radiator Institute

NEW YORK—The Geneva, N. Y. office of The Institute of Boiler and Radiator Manufacturers was closed December 31 and the activities of the Institute consolidated in the New York office at 60 E. 42nd St. This follows a decision made at the annual meeting of the Institute held in New York December 7.

The Geneva office was headquarters for the Institute under the direction of F. W. Herendeen, secretary, for nearly 25 years. About two years ago the New York office was opened with R. E. Ferry as general manager. Mr. Ferry will continue as general manager in the New York office and will also assume the duties of treasurer.

A committee was appointed at the annual meeting to draft a resolution to be incorporated in the records of the Institute covering the sentiment of the members toward Mr. Herendeen and in connection with the termination of his long tenure of office as secretary and treasurer.

At the meeting a program of activities for 1940 was approved. This program approves the adoption of a plan for rating low pressure cast iron heating boilers under the IBR testing and rating code and the development of a research program in the interests of radiator heat.

The Institute, as reported elsewhere on these pages, is backing a plan for simplified practice in radiator sizes.

Tide Water Enters Burner Field

NEW YORK—John D. Collins, vice-president in charge of sales for the Tide Water Division of Tide Water Associated Oil Company, has announced that the company has recently placed on the market in eastern states its new Tydol Silent Knight automatic oil burner.

Tide Water has for many years been one of the major distributors of fuel oil for heating purposes but has not heretofore engaged in the manufacture and sale of oil burners. The new burner has already been sold in Rhode Island and Massachusetts and the company plans to franchise its fuel oil distributors in their respective marketing areas to sell the burners through their own sales organizations.

Viking Moves to New Quarters

CLEVELAND—Viking Air Conditioning Corporation, Cleveland, Ohio, has moved to its new factory at 8500 Richmond Ave., Cleveland. The new plant contains more than three times the floor space formerly occupied.

ABSTRACTS of Current Papers, Books and Pamphlets

Hospital Heating

In hospitals, heat must be supplied for heating of rooms, for kitchens, for drying of linen, for disinfection, for sterilization and finally for bathrooms. For heating of rooms, ceiling radiation plants seem to be the most suitable. The heating steam consumption for a kitchen (for patients and staff) is about 5.5 lbs. per one person daily; the mains must, however, be calculated for 1 lb. per person, per hour. The steam consumption of the laundry amounts to 44 to 66 lbs. per bed, per week; the staff linen laundry consumes additionally about 26 lbs. per person, per week. For sterilization of bandages about 65 to 90 per hour for one sterilization unit must be provided. Besides, there is also an apparatus for sterilization of instruments. The consumption of heat for bath purposes depends on whether medicinal baths are used or not.

Hot water is particularly used for room heating; for other purposes, steam is generally used. For kitchen pots, warming-cupboards and warming-tables in the kitchen, for the laundry machines and for disinfecting, low pressure (5.6 to 7 lbs. per sq. in.) is satisfactory; for other apparatus, however, higher temperatures must be adopted. For sterilization, steam of 15.5 lbs. per sq. in. and 250F seems to be necessary. When in addition to heating purposes, the steam serves the hospital power plant, then, of course, the high pressure steam plant is to be employed. In other cases, however, the more economical low pressure plant is to be chosen; in this case high pressure steam for sterilization is produced in a special small electrode boiler.

[*"Heating in Hospitals" by W. Spilhagen in Gesundheits-Ingenieur, August 12, 1939, page 453. Published by Verlag R. Oldenbourg, Munchen 1, Brieffach 31, Germany. Price 0.75 RM, approximately 30 cents. Abstracted by Dr. Stephen Zamenhof, M.E.*]

•

Cooling with Radiant Heating Plants

In many countries the number of days during which air cooling would be required is not sufficient to justify the installation of special summer air conditioning plants. In the cases where a ceiling (panel) radiant heating plant is installed, it can also serve conveniently for cooling air in summer by passing the cold water through the pipes in the ceiling. This seems to be possible only in the case of such ceiling pipes, because radiators near the floor would cool only the lowest layers of the air and would therefore be unsuitable for comfort cooling. In the case of ceiling cooling, humidity condensation could be feared, but the author is of the opinion that in climates in which this kind of air conditioning could find application, the danger of humidity condensation does not exist. The author bases his considerations on experimental data obtained by the measurements at "Jelmoli," a Department Store in Zurich, Switzerland.

[*"Conversion of Ceiling Heating into Room Cooling" by P. E. Wirth in Schweizerische Bauzeitung, November, 1938, page 237. Published by Verlag C. & W. Jegher, Zurich, Dianastrasse 5, Switzerland. Price 1 Sfr., approximately 25 cents. Abstracted by Dr. Stephen Zamenhof, M.E.*]

BRIEF REVIEWS

Estimating Fumes in Air. Describes a vapor pressure method for the estimation of volatile solvents in industrial workrooms. The vapor-laden air is drawn through a specially designed trap immersed in a dry-ice and acetone mixture, which freezes out the vapor. The trap is then evacuated while in the freezing mixture and the pressure of the compound in the vaporous stage is measured at room temperature in an attached mercury manometer. Quantitative results were obtained with known amounts of organic vapors whose melting points are above —63C. For substances having lower melting points, liquid nitrogen is suggested as the freezing agent. An advantage of the method is the possibility of verifying the results by subsequent chemical determination of the material collected. [*"A Vapor Pressure Method for the Estimation of Volatile Solvents," by C. E. Couchman and W. H. Schulze. Published in the Journal of Industrial Hygiene and Toxicology, September, 1939, pages 256 to 263. Journal published by the Williams & Wilkins Co., Mount Royal & Guilford Aves., Baltimore, Md. Price, single copies, 75 cents.*]

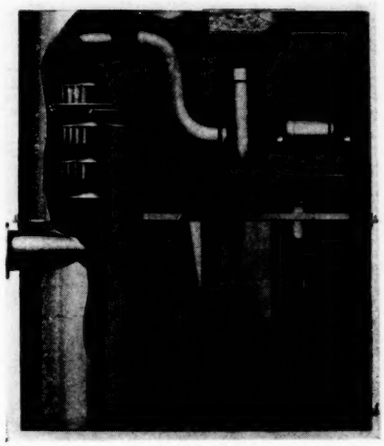
Plumbing. Report deals with the particular problem of preventing backflow from over-rim supply fixtures such as lavatories. [*"Backflow Prevention in Over-rim Water Supplies," by G. E. Golden and R. B. Hunter. Building Materials and Structures Report BMS28. Published by the National Bureau of Standards, United States Department of Commerce. Paper cover; 8½ x 11 in.; 17 pages; price 10 cents. For sale by the Superintendent of Documents, Washington, D. C.*]

Estimating Fumes in Air. A method is described for estimating the concentration of certain organic solvents in air. By freezing out the solvent from a large volume, the partial pressure of the solvent in the sample can be accurately estimated. Since removal of water from the sample was found impractical for use in this method, water is kept present in the coil and its vapor pressure subtracted from the readings obtained. The method is applicable for any concentration of relatively volatile substances, insoluble in water and freezing above —80C. [*"A Vapor-Pressure Method for Determination of the Concentration of Some Organic Solvents in Air," by K. Kay, G. M. Reece and P. Drinker. Published in the Journal of Industrial Hygiene and Toxicology, September, 1939, pages 264 to 269. Journal published by the Williams & Wilkins Co., Mount Royal & Guilford Aves., Baltimore, Md. Price, single copies, 75 cents.*]

NEW EQUIPMENT

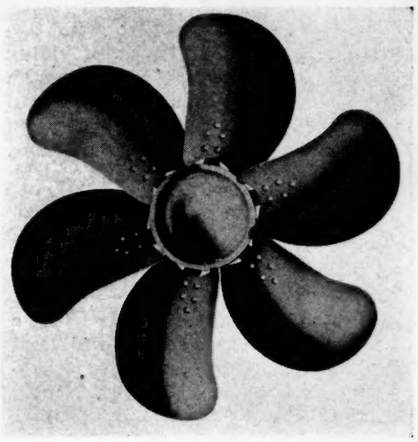
Schneible Dust Collector

NAME—Midget multi-wash dust collector.
PURPOSE—A portable type collector for the collection and disposition of dusts and fumes arising from isolated operations or machines and equipments that cannot be economically tied into a central dust collecting system.
FEATURES—Manufacturer states that the unit is portable, compact, entirely self-contained and continuous and fully automatic in operation. Fouled air is drawn into a miniature scrubbing tower where dust and fumes are scrubbed out by spray walls and become impinged on a multiplicity of curved wet vanes arranged in several tiers. Impinged matter is washed



A portable dust collecting system.

down to a sludge chamber by the turbulent action of water introduced above the impingers. The washed air next passes through an entrainment separator to remove excess moisture and is then delivered to the plant atmosphere passing through a metal-wool diffuser and sound deadener as it leaves the unit. There are no bags or screens to clean out and no dry dust to handle. The sludge is settled in a dewatering compartment from where it is drawn off for disposition occasionally, the water or other washing medium being recirculated over and over. It is said that as only a small amount of water is needed it can be put in by hand, no piping being required. Motors are completely sealed from dust and moisture and the manufacturer claims the unit has a comparatively low operating and maintenance cost. The unit is claimed to be a complete, self-contained dust collecting system.
SIZES & CAPACITIES—6 sizes ranging from 300 to 1500 c.f.m.
MADE BY—*Claude B. Schneible Company, Dept. 62V, 3951 W. Lawrence Ave., Chicago, Ill.*

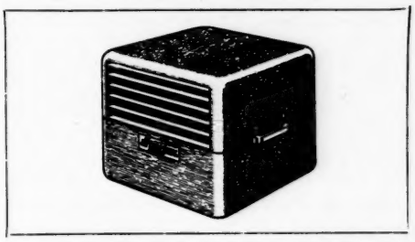


Low cost 6 blade fan assembly.

Lohman Fan Blade Assembly

NAME—Lohman fan blade assembly.
PURPOSE—A low cost blade assembly for direct or belt drive applications.
FEATURES—Blades are made from stampings and forming dies and are said to require no drill-outs, no slugs nor any filing to make blades balance. Blades are made of hardened steel and are said to have the strength and weight for extra heavy duty.
SIZES—6 blade assembly in sizes from 30 to 70 inch in diameter.
MADE BY—*William J. Lohman, Inc., 62 Ninth Ave., New York, N. Y.*

Alter Humidifier and Evaporative Cooler

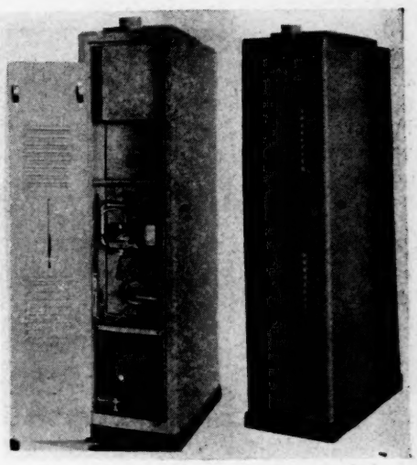


For humidifying and evaporative cooling.

NAME—Humidome humidifier and spot cooler.
PURPOSE—For humidifying during winter and for cooling by evaporation.
FEATURES—Unit is self-contained in a cabinet of baked Hammerloid finish. A revolving mesh drum in the unit is said to evaporate water up to 3 qt. per hour depending on the dryness and temperature of the room. The manufacturer states that under ordinary circumstances the unit need be filled once a day to the capacity of 5 gal. In order to start the unit operating, it is only necessary to fill it with water and plug it in a light socket.
MADE BY—*The Harry Alter Company, 1728 So. Michigan Ave., Chicago, Ill.*

Palmer Forced Air Furnace

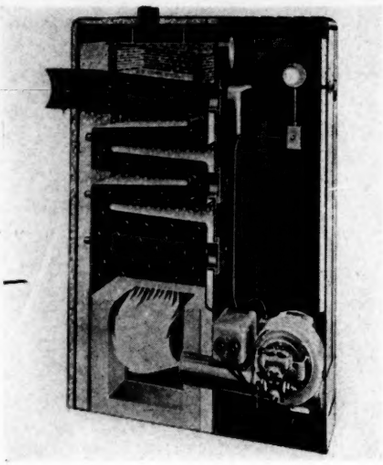
NAME & MODEL NO.—Palmer forced air furnace model FA-50.
PURPOSE—For heating, air circulation, humidifying, and filtering.
FEATURES—Outstanding feature is the compact size, the 50,000 B.t.u. furnace requiring a floor space of 13 in. x 25 in. and being 53 in. tall. Unit is equipped with a summer-winter switch so that the large blower may be used for air cooling in summer and may be combined with mechanical refrigeration coils for complete air conditioning. Unit is gas fired.
SIZES & CAPACITIES—14 sizes from 50,000 to 600,000 B.t.u. per hour input capacity.
MADE BY—*Palmer's Manufacturing Corp., Phoenix, Ariz.*



May be installed in a closet.

Weston Stack Thermometer

NAME & MODEL NO.—Weston stack thermometer model 5-H-4.
PURPOSE—For measuring flue gas temperatures.
FEATURES—Thermometer was designed to enable heating contractors and service men to meet the requirements of the Oil Burner Industry Standards Committee. Thermometer is of the all metal type and is designed for use with a sleeve holder which sleeve holds the thermometer stem in a horizontal position in the center of the flue gas stream. A shatter-proof scale glass is employed. Temperature range is from 200 to 1000F with an accuracy guaranteed within 1%. In order to install this thermometer, it is necessary to drill a 5/16 inch hole in the pipe, insert the tapered sleeve holder until it fits tight, then slip the thermometer stem in the sleeve.
MADE BY—*Weston Electrical Instrument Corporation, 614 Frelinghuysen Ave., Newark, N. J.*



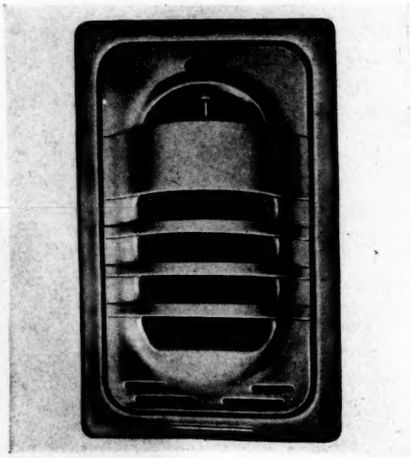
Steel boiler without tubes.

Penn Steel Boiler

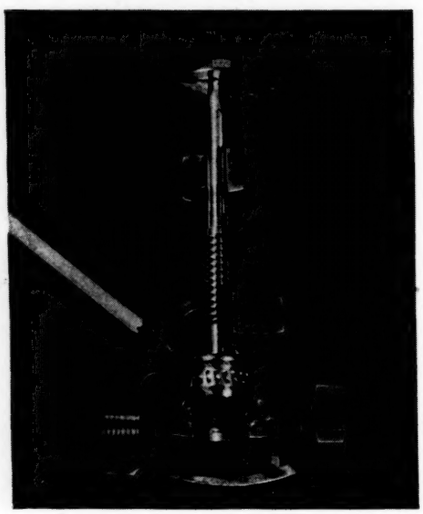
NAME — Penn tubeless steel boiler-burner unit.
PURPOSE—For supplying steam or hot water using oil as a fuel.
FEATURES—Boiler is constructed of steel and is furnished complete with burner and controls. No tubes are used and the steel is welded into a one-piece assembly. Tankless hot water coils are submerged in boiler water. Gun type oil burner and controls are housed in compartment in front of boiler. Combustion chamber is built in and is surrounded by water legs.
SIZES & CAPACITIES—10 sizes with capacity range from 325 to 1150 sq. ft. steam EDR and 520 to 1840 sq. ft. hot water EDR.
MADE BY—*Penn Boiler & Burner Mfg. Corp., Lancaster, Pa.*

Day and Night Water Heater

NAME—Lectro-Glo wall heater.
PURPOSE—A gas fired wall type heater for providing radiant, reflected and circulating heat.
FEATURES—Radiant heat is produced by stainless steel grid located above the burner. In operation this grid becomes heated to a red glow, concealing any open flames. Reflected heat is produced by means of a satin-finished reflector behind the grid. Circulated heat is obtained by providing openings in the heater frame through which air circulates around the wall box, behind the reflector, and between the inner and outer shells of the heater. An important result of this circulating feature is to keep the walls around the heater cool. Heaters are supplied in three standard colors, ivory, walnut and white, or in any desired color at additional cost.
MODEL AVAILABLE — W8 with a single burner, sizes 10¾ in. wide and 19⅛ in. high, and W13 with twin burners 14⅛ in. wide and 19⅛ in. high.
MADE BY—*Day & Night Water Heater Co., Monrovia, Calif.*



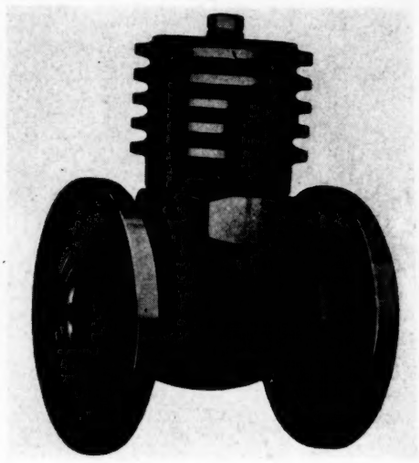
Gas fired wall heater.



Spinning disc resists wear.

Ostlind Valve

NAME—Ostlind valve.
PURPOSE—For controlling the flow of steam in such a manner as to eliminate the causes of leaky valves.
FEATURES—Valve features a spinning disc which rotates up to 2000 r.p.m. for a moment preceding closing. It is stated that the disc does not spin when the valve is cracked or throttling. A reversing chamber directs the steam flow to turbine vanes just before the disc descends into the seat and these vanes are shielded from the steam flow when the valve is open. Manufacturer claims that the spinning disc throws off scale and other foreign particles by centrifugal force and the disc hits the seat when spinning at a high rate of speed and consequently polishes the line of closure, creating a complete metal-to-metal contact between seat and disc and thus preventing wire-drawing.
SIZES—From ½ inch up.
MADE BY—*Ostlind Valve, Inc., Portland, Ore.*



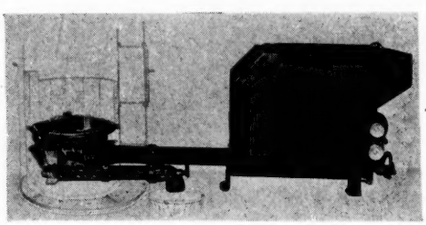
Controls liquid flow.

Hoppe Electric Valve

NAME & MODEL NO.—Hoppe Type D flanged end valve.
PURPOSE—For controlling the flow of Freon, methyl chloride, sulphur dioxide, brine, air, oil, water, steam, and ammonia.
FEATURES — Improvements incorporated in this valve include an operating steam pressure of 250 lb. instead of 150 lb., a new design solenoid with glass insulation for withstanding higher temperatures and a new modernistic coil shield which helps dissipate the heat.
SIZES AVAILABLE — Horizontal or angle screwed ends, sizes ⅛ to 3 in.; horizontal or angle flanged ends, sizes ¾ to 3 in.
MADE BY—*Hoppe Engineering Company, Indianapolis, Ind.*

Cornell Stoker

NAME—Cool-Flue.
PURPOSE—For burning coal without mechanical draft.
FEATURES — Manufacturer claims that by eliminating the fan and blower the stack temperature is reduced considerably. Also that clinkers are eliminated and only a small amount of fine ash is created. This ash is said to be removed automatically from the revolving grates and deposited in dust-proof containers. Manufacturer claims in case of electrical failure, this stoker may be fired by hand.
MADE BY — *Cornell Manufacturing Company, Indianapolis, Ind.*



Employs natural draft.

Degree-Day Figures for November, 1939

HEATING & VENTILATING continues its twelfth year of publishing degree-day data for various large cities

	Albany, N. Y.	Atlanta, Ga.	Baltimore, Md.	Birmingham, Ala.	Boston, Mass.	Buffalo, N. Y.	Burlington, Vt.
Degree-days for November, 1939.....	894	420	531	385	727	812	985
Degree-days, Sept. 1, '39 to Nov. 30, '39	1560	528	771	485	1168	1354	1765
Degree-days, Sept. 1, '38 to Nov. 30, '38	1351	427	674	396	973	1198	1576
Degree-days, Sept. 1 to Nov. 30, Normal	1292	492	790	318	1104	1268	1486

	Cheyenne, Wyo.	Chicago, Ill.	Cincinnati, Ohio	Cleveland, Ohio	Columbus, Ohio	Denver, Colo.	Des Moines, Iowa
Degree-days for November, 1939.....	816	702	660	695	683	637	704
Degree-days, Sept. 1, '39 to Nov. 30, '39	1497	1078	930	1074	996	1021	1114
Degree-days, Sept. 1, '38 to Nov. 30, '38	1632	972	820	940	910	1181	1041
Degree-days, Sept. 1 to Nov. 30, Normal	1745	1112	863	1125	1003	1259	1155

	Detroit, Mich	Dodge City, Kan.	Duluth, Minn.	El Paso, Tex.	Erie, Pa.	Evansville, Ind.	Fort Wayne, Ind.
Degree-days for November, 1939.....	788	605	878	404	745	591	754
Degree-days, Sept. 1, '39 to Nov. 30, '39	1295	852	1825	476	1184	776	1185
Degree-days, Sept. 1, '38 to Nov. 30, '38	1136	875	1850	488	1014	640	1032
Degree-days, Sept. 1 to Nov. 30, Normal	1219	948	1943	421	1125	683	1073

	Fort Worth, Tex.	Grand Rapids, Mich.	Green Bay, Wis.	Harrisburg, Pa.	Hartford, Conn.	Indianapolis, Ind.	Ithaca, N. Y.
Degree-days for November, 1939.....	330	744	822	668	760	672	850
Degree-days, Sept. 1, '39 to Nov. 30, '39	366	1250	1487	1021	1243	964	1415
Degree-days, Sept. 1, '38 to Nov. 30, '38	386	1075	1324	957	1025	865	1317
Degree-days, Sept. 1 to Nov. 30, Normal	252	1250	1558	989	1097	985	1325

	Kansas City, Mo.	Knoxville, Tenn.	La Crosse, Wis.	Lansing, Mich.	Lincoln, Neb.	Little Rock, Ark.	Los Angeles, Calif.
Degree-days for November, 1939.....	636	536	802	828	660	448	21
Degree-days, Sept. 1, '39 to Nov. 30, '39	862	669	1373	1428	1006	565	38
Degree-days, Sept. 1, '38 to Nov. 30, '38	775	591	1293	1263	962	491	124
Degree-days, Sept. 1 to Nov. 30, Normal	826	702	1467	1456	1069	428	123

	Louisville, Ky.	Madison, Wis.	Memphis, Tenn.	Milwaukee, Wis.	Minneapolis, Minn.	Nashville, Tenn.	New Haven, Conn.
Degree-days for November, 1939.....	614	773	453	718	820	537	728
Degree-days, Sept. 1, '39 to Nov. 30, '39	808	1303	574	1199	1511	683	1158
Degree-days, Sept. 1, '38 to Nov. 30, '38	707	1251	467	1135	1447	588	942
Degree-days, Sept. 1 to Nov. 30, Normal	738	1437	464	1380	1537	619	1092

	New Orleans, La.	New York, N. Y.	Norfolk, Va.	Oklahoma City, Okla.	Omaha, Neb.	Peoria, Ill.	Philadelphia, Pa.
Degree-days for November, 1939.....	159	654	444	463	704	715	601
Degree-days, Sept. 1, '39 to Nov. 30, '39	185	971	573	564	1080	1069	881
Degree-days, Sept. 1, '38 to Nov. 30, '38	193	796	468	595	1016	952	735
Degree-days, Sept. 1 to Nov. 30, Normal	102	894	510	564	1109	1173	830

	Pittsburgh, Pa.	Portland, Me.	Portland, Oreg.	Providence, R. I.	Reading, Pa.	Reno, Nev.	Richmond, Va.
Degree-days for November, 1939.....	671	836	453	748	642	598	550
Degree-days, Sept. 1, '39 to Nov. 30, '39	998	1478	776	1191	999	996	767
Degree-days, Sept. 1, '38 to Nov. 30, '38	911	1258	866	954	894	1315	638
Degree-days, Sept. 1 to Nov. 30, Normal	982	1343	995	1104	1013	1311	641

	Rochester, N. Y.	St. Louis, Mo.	Salt Lake City, Utah	San Francisco, Calif.	Scranton, Pa.	Seattle, Wash.	Spokane, Wash.
Degree-days for November, 1939.....	816	587	570	173	796	418	762
Degree-days, Sept. 1, '39 to Nov. 30, '39	1346	786	979	373	1320	885	1361
Degree-days, Sept. 1, '38 to Nov. 30, '38	1193	667	1238	492	1155	964	1384
Degree-days, Sept. 1 to Nov. 30, Normal	1289	802	1129	521	1189	1165	1526

	Springfield, Ill.	Syracuse, N. Y.	Toledo Ohio	Trenton, N. J.	Utica, N. Y.	Washington, D. C.	Wichita, Kan.
Degree-days for November, 1939.....	648	851	733	681	897	572	565
Degree-days, Sept. 1, '39 to Nov. 30, '39	918	1383	1166	1033	1453	840	754
Degree-days, Sept. 1, '38 to Nov. 30, '38	800	1212	1039	878	1379	732	761
Degree-days, Sept. 1 to Nov. 30, Normal	963	1319	1110	830	1393	845	828

Methods of applying the degree-day in connection with the operation of heating plants or for the prediction of fuel consumption of heating plants are described fully in the new enlarged edition of the DEGREE-DAY HANDBOOK, published by HEATING & VENTILATING, 148 Lafayette Street, New York, price $3. Degree-days as given above for a "normal" month or season are based on averages for a long period of years, ending about 1922. Averages covering different periods will disagree with the above figures slightly.

TRADE FRICK MARK
Refrigeration
Air Conditioning
Using three big Frick Machines, totaling 650 tons capacity—a cooling effect equal to using 1,300,000 pounds of ice a day.
The air conditioning system, designed by Charles S. Leopold, includes radiant heating and cooling by pipes within the outside walls.
Tinsley, McBroom & Higgins, Architects: Pennsylvania Engineering Company, Contractors.
DEPENDABLE REFRIGERATION SINCE 1882
FRICK CO.
WAYNESBORO, PENNA. U.S.A.

COMING EVENTS

JANUARY 12-13. Fifth annual meeting of the Louisiana Engineering Society. Headquarters, St. Charles Hotel, New Orleans. Further information available from Arthur J. Naquin, Chairman, Publicity Committee, Louisiana Engineering Society, Suite 422, St. Charles Hotel.

JANUARY 15-18. Sixth annual convention of the Refrigeration Service Engineers Society in conjunction with the Second All-Industry Refrigeration and Air Conditioning Exhibition sponsored by the Refrigeration Equipment Manufacturers Association, to be held in Chicago. National Secretary of the Society, H. T. McDermott, 433 N. Waller Ave., Chicago.

JANUARY 17-19. 35th Annual Meeting, American Society of Refrigerating Engineers, Hotel Blackstone, Chicago, Ill. ASRE headquarters, 37 West 39th St., New York.

JANUARY 22-24. Annual convention, National Warm Air Heating and Air Conditioning Association, Hotel Hollenden, Cleveland, Ohio. To be held in conjunction with the Sixth International Heating and Ventilating Exposition, NWAH & AC Assoc., Managing Director, 5 E. Long St., Columbus.

JANUARY 22-26. 46th annual meeting of the American Society of Heating and Ventilating Engineers, Hotel Statler, Cleveland Ohio. To be held in conjunction with the Sixth International Heating and Ventilating Exposition. ASHVE, 51 Madison Ave., New York.

JANUARY 22-26. Sixth International Heating and Ventilating Exposition to be held at Lakeside Hall, Cleveland. Exposition under the direction of Charles F. Roth, International Exposition Co., Grand Central Palace, New York.

APRIL 9-10. Annual Midwest Power Conference; Palmer House, Chicago, under direction of Prof. S. E. Winston, 401 S. Quincy St., Hinsdale, Ill.

MAY 14-17. Annual meeting of the National District Heating Association; French Lick Springs Hotel, French Lick, Indiana. Further information available from John F. Collins, Jr., Secretary-Treasurer National District Heating Association, 1231 Grant Building, Philadelphia, Pa.

MAY 21-24. 34th annual convention of the Smoke Convention Association at Hotel Statler, St. Louis.

JUNE 6-7. Annual meeting of the Stoker Manufacturers Association at the Homestead Hotel, Hot Springs, Va.

WITH THE MANUFACTURERS

Barber-Colman Co., Rockford, Ill., has opened a branch office in Atlanta for the sale of its control and air distribution equipment. *Douglas S. Sterner* will be in charge of the office which is located at 78 Baker St., N.W., Atlanta.

Earl Marr

Chrysler Corporation, Airtemp Division, Dayton, Ohio, has appointed *Earl Marr,* widely known throughout the oil industry, as sales manager of heating. Mr. Marr in the early 1920's had his own burner, sold under the name of the Marr Heat Machine. From 1931 to 1939 he was head of the oil burner division of Westinghouse Electric Supply Co.

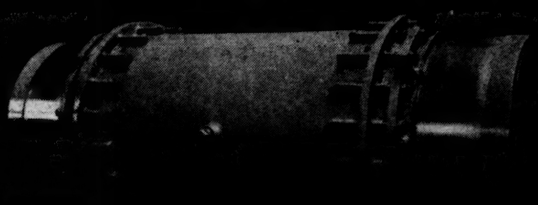
Lee-Stockman, Inc., advertising counsellors, New York, announce that *J. F. Koellisch,* former editor of *Plumbing and Heating Trade Journal,* has become associated with them as publicity director and account executive. He is specializing in building equipment and allied lines.

YARWAY GUN-PAKT EXPANSION JOINT

It is packed under full steam pressure. By the turn of a wrench, integral pressure guns force a special semi-plastic packing into the stuffing box.

Welded Steel Construction. Alemite lubricated cylinder-guided sleeve. Made also in conventional gland-pakt types. Write for Bulletin EJ-1906.

YARNALL-WARING COMPANY
104 Mermaid Ave. PHILADELPHIA



One of 40 – 24" Yarway Gun-Pakt Expansion Joints recently purchased by a leading automobile manufacturer. Good for 300 lbs. pressure, with welding ends and welded steel base.

The Harry Alter Company, Chicago, refrigeration and air conditioning jobbers, has opened four new branch warehouses in the New York metropolitan district and moved its main New York office. This makes a total of five outlets in the New York district. The main office is now at 134 Lafayette St., and branches have been opened at 339 E. 162 St., Bronx; 1130 Bedford Ave., Brooklyn; 145-06 Jamaica Ave., Jamaica, and 159 S. Orange Ave., Newark.

Young Radiator Company, Racine, Wisc., has appointed *Wm. C. Minkler* as assistant sales manager of the catalog products division which sells through distributors to the heating and air conditioning trade. Mr. Minkler was formerly with Westinghouse Electric Manufacturing Co. and with John A. Connelly, Westinghouse Distributors in Philadelphia. His headquarters will be in Racine.

NEW TRADE LITERATURE

Exhaust Fans. A standard size 10-page catalog, describing the DeBothezat Bifurcator, which is a specially designed fan for conveying corrosive, high temperature and hazardous fumes or gases. Catalog gives information on construction, installation, capacities, and sizes available. DeBothezat Ventilating Equipment Division, American Machine and Metals, Inc., East Moline, Ill.

Gas Heating Heaters. Standard size, loose-leaf, 12-page bulletin S-347, illustrating and describing the Trane line of gas fired winter air conditioning units. Gives information on gas unit heaters, space heaters and winter air conditioners. The Trane Company, LaCrosse, Wis.

Insulation. A standard size, approximately 200-page manual on Ehret insulation. This manual has been prepared to assist men who are interested in choosing, applying or using thermal insulations. The information is presented in data sheet form. Besides listing the properties of the many types of insulation made by this company, the manual includes a large amount of basic data on insulation and heat transfer. Ehret Magnesia Manufacturing Company, Valley Forge, Pa.

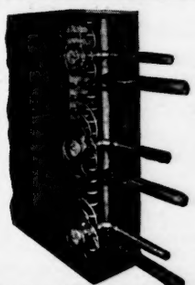
Pipe. A convenient chart showing the colors used in standard classification of piping systems to identify fire protective systems and piping carrying dangerous or valuable materials. Chart is based on the "Recommended American Practice Scheme for the Identification of Piping Systems" as approved by the American Standards Association. Copies available on request through local Jones & Laughlin Steel Corporation's standard pipe distributors and jobbers. Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

Pumps. An illustrated broadside, Form 1917, showing construction details of the Ingersoll Rand motor pump. This pump which is designed for all types of general service is built in sizes for delivery from 5 to 1000 gal. per min. and heads up to 500 ft. The entire unit is enclosed in a housing which requires no bed plate or foundation and may be bolted down for operation in any position. Broadside gives details of construction and a number of typical installation pictures. Ingersoll-Rand, Phillipsburg, N. J.

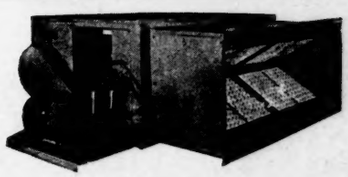
Marlo Coil Co.

6135 MANCHESTER AVE.,
ST. LOUIS, MO.

Canada and British Isles:
Universal Cooler Co.,
Brantford, Ontario

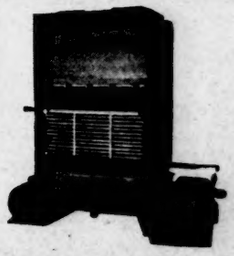


Air Conditioning Coils —Blast Coils
Extended surface coils for all refrigerants. Made of any of the common metals. Blast coils for steam, water, or brine. Complete details in Bulletin No. 396.



Air Conditioning Units
Air Conditioning Units in either ceiling suspended or floor type. Capacities from 900 cu. ft. to 12,000 cu. ft. Sturdily built on welded angle iron frames of sectional design for easy installation. Bulletin No. 397 gives complete details.

Makers of Complete Line of Low Side Equipment



Evaporative Condenser
Self-contained; single motor drive for fans and pump; coil all prime surface; electric welded frame galvanized after fabrication; internal surface covered with corrosion resistant mastic. Full details in Bulletin 394.

Y-5

• ALPHABETICAL INDEX OF ADVERTISERS •

A

Ahlberg Bearing Co. 107
Air Conditioning Exposition 10
Alter, Harry, Co. 65
American Air Filter Co., Inc. 97
American District Steam Co. 59
American Society of Heating and Ventilating Engineers 109
Anemostat Corporation of America *
Armstrong Machine Works 14
Au-Temp-Co. Corp. 128

B

Badger, E. B., & Sons Co. 30
Baldor Electric Co. 106
Barber-Colman Co. 112
Bethlehem Steel Co. ..... *
Buffalo Forge Co. 5-6-7
Burnham Boiler Corp. 62

C

Carey, Philip, Co. 105
Carnegie-Illinois Steel Corp. 4
Cash, A. W., Co. 123
Chace, W. M., Co. 125
Clarage Fan Co. ....Inside Back Cover
Classified Advertisements 152
Columbia Steel Co. 4
Crane Co. ..... *
Curtis Refrigerating Machine Co.. 86

D

Detroit Lubricator Co. 119
Dunham, C. A., Co. 49

E

Elgo Shutter & Mfg. Co. 128

F

Fedders Manufacturing Co. 27
Frick Co. 150

H

Healy-Ruff Co. 65
Heating & Ventilating 64-108
Heating & Ventilating Exposition, 6th International 10

I

Illinois Engineering Co. 51
Illinois Testing Laboratories 125
Industrial Press 64-108

J

Johnson Service Co. 110

K

Kewanee Boiler Corp. 28

L

Lovejoy Flexible Coupling Co. 152

M

Marlo Coil Co. 151
McCord Radiator & Mfg. Co. 57
Mercoid Corporation 127
Minneapolis-Honeywell Regulator Co. 117
Mueller Brass Co. 3

N

Nash Engineering Co. 16
National Association of Ice Industries 66
National Tube Co. 68

O

Owens-Corning Fiberglas Corp.... 101

P

Patterson-Kelley Co., Inc. 128
Penn Electric Switch Co. 121
Porter, H. W., & Co., Inc. 65
Powers Regulator Co. ....Back Cover

R

Rempe Co. 85
Research Products Corp. 107
Ric-wiL Co. 63

S

Sarco Co., Inc. ..... Insert bet. 10-13
Spoehrer-Lange Co. 65
Staynew Filter Corp. 103
Sterling Engineering Co. ..... *
Sterling Pump Corp. 106
Streamline Pipe and Fittings Div. Mueller Brass Co. 3
Surface Combustion Corp. 62

T

Tennessee Coal, Iron & Railroad Co. 4
Torrington Mfg. Co. 13
Trane Company 8-9

U

United States Air Conditioning Corp. 88
United States Steel Corp. Subsidiaries 4-68

W

Wagner Electric Corp. 99
Want Advertisements 152
Webster, Warren, & Co., Inside Front Cover
Western Silicair Products, Inc.... *
Wing, L. J., Mfg. Co. 61

Y

Yarnall-Waring Co. 55-85-151
Young Radiator Co. 53

*Advertisement appeared in preceding issue.

CLASSIFIED ADVERTISING

Non-display advertisements 10 cents a word per insertion. (No charge for name and address.) Minimum charge $2.00. Payable in advance.

L-R • everlasting • FLEXIBLE COUPLING

Type UX, a silent, sturdy new coupling for drives 1/4 HP or less. Fan users can save 1/3 on coupling cost. Write.

Lovejoy Flexible Coupling Co.
5022 W. Lake St., Chicago, Ill.

WANTED—A small progressive Chicago firm desires to contact engineer with sales experience of heating, ventilating and air-cooling, capable to design comfort conditions, layout and estimate cost of sheet metal work, etc. Knowledge of commercial refrigeration desirable but not necessary. Man chosen will work on salary. Write giving complete information as to age, education, experience, present situation, salary desired, etc. Box No. 530, HEATING & VENTILATING, 148 Lafayette St., New York.

The New York Blower Company has openings in certain territories, within a 500 mile radius of LaPorte, Indiana, for successful and experienced representatives, for the sale of the full line of Fan and Blower Products of this old and well established blower company. This includes sales representation for Fans and Blowers, Industrial Unit Heaters, and Classroom Unit Ventilators. For further information address Sales Manager, The New York Blower Company, 3153 Shields Ave., Chicago, Ill.